Telephony

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RACINE TELEPHONE EXCHANGE

A Description of a Modern Independent Installation

By Earl C. Long

TO those Independent telephone companies who boast of excellent long distance connections, or who can give service to the nearest large city, the matter of successful competition is not a difficult problem. There are, however, even at this late date, a number of Independent exchanges which are hemmed in on all sides by territory devoid of Independent development. Racine, Wisconsin, belongs to the latter class, as it lies between the cities of Chicago and Milwaukee, neither of which give Independent connection.

Racine is not only isolated in this respect, but the Bell company has had installed for a number of years the most modern common battery equipment, so that with its excellent long distance facilities and modern local equipment it is most strongly entrenched to give battle to a rival.

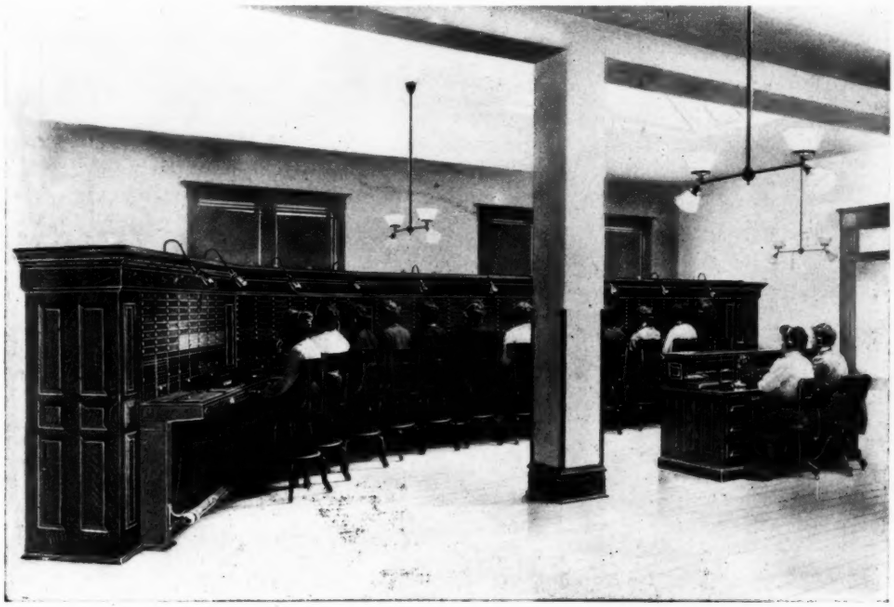


Figure 1.
Multiple lamp signal common battery switchboard and combined chief operator's and monitor's desk. There are 1,680 lines equipped and the exchange is designed for an ultimate of 6,400 lines.

The Citizens' Telephone Company, which is the Independent organization of Racine, was two years ago more than holding its own with antiquated magneto equipment, but being a progressive organization, with the interests of its patrons at heart, determined to make a change and to give the best possible service so as to be a worthy competitor of the Bell.

A successful modern telephone exchange must take advantage of not only every practical improvement in central office and subscribers' equipment, but all details of outside construction as well as the proper housing and location of the central office equipment. Also in making a change from an antiquated system to one of modern design, it has always proven more economical and a better business proposition to do away entirely with the old equipment and make a complete change at once, so that the full benefit of the improved service can be appreciated by the patrons. It has always been a tendency among the Independent telephone companies to consider the gradual changing over to a new system with the idea that it is more economical, but when everything is taken into consideration, the latter method leaves the system in an unfinished condition throughout the entire change, which covers in most cases a number of years. It is needless to say that the subscribers do not enthuse when subjected to this kind of treatment.

The permanency of the exchange building is another important item which should receive careful consideration when re-equipping a telephone plant, as a modern switchboard is of such a character that it is practically impossible to change its location to another building without entirely putting it out of service.

At Racine, all modern methods and types of equipments were carefully considered, and when the change was finally decided on, a centrally located building site was purchased and a modern two-story fireproof exchange building, 40x80 feet, constructed to accommodate the type of switchboard equipment adopted. While this building has many unique features, possibly the most prominent is the use of a fire wall, which separates the apparatus end of the building from that containing the offices and operators' recreation rooms.

In order to successfully compete with the Bell company

the most efficient operation was necessary, and it was imperative that several defective details of operation which were inherent in the latter company's system, and the cause of much complaint among subscribers, should be completely avoided. First, it was necessary to give a four-party selective ringing service which would be absolutely non-interfering and devoid of the expense and maintenance of grounds or third wire connections. Second, rural line service with eight-party selective ringing was also desired, as by this means a business getting service could be inaugurated. Third, great economy in exchange operation was a most important requirement, one which was to determine the future success of the company. Fourth, the many defects in the operating of the Bell common battery switchboard, such as the "vicious click," or "bat," as it is sometimes called, which the subscriber receives in the ear when making a connection, should be entirely done away with.

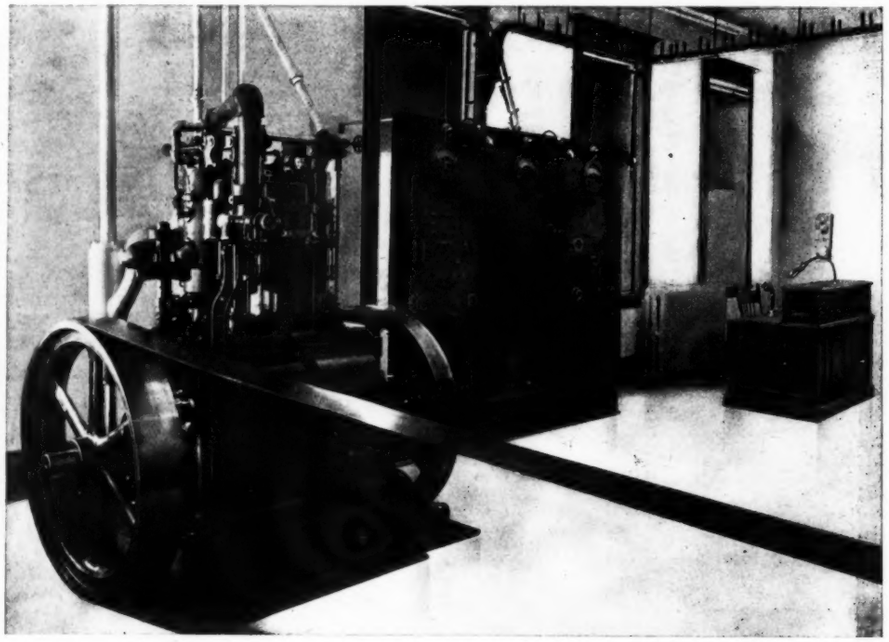


Figure 2.
Gas engine, power board and wire chief's desk. The former operates from either gas or gasoline and furnishes all of the power used in the exchange building. Other sources of power, however, are provided for emergency purposes.

Equipment fulfilling all these requirements was installed and put in operation in December of last year, the cut-over from the old equipment being made in a very short space of time, considering the many difficulties encountered.

The new switchboard is of the full common battery multiple type, and is shown in Figures 1 and 3. It consists of 1,680 local lines arranged in five, three-position sections, each local cord circuit being equipped with four-party individual indicating ringing keys. A combined chief operator's and monitor's desk, shown in the foreground of Figure 1, is also provided, as well as a wire chief's desk, shown in Figure 2. A two-position toll and rural line switchboard, equipped with a calculagraph for recording the lapsed time on toll tickets, was furnished and located in a separate room in the telephone building. The distributing frames and relay rack are shown in Figure 4, while the cable runs from these frames to the switchboard, which is located in the room directly above, as shown in Figure 5.

Figures 6 and 7 show the power plant machines and the exchange storage battery respectively.

In order to produce an economical operating plant, a two-cylinder, fifteen horse-power, combination gas and gasoline engine was installed and connected by belting to a 110-volt Holtzer-Cabot compound wound lighting dynamo for lighting and power purposes. This dynamo was made of sufficient output to furnish all of the lighting and other current for the exchange building, as well as to furnish current for operating one of the motor generator storage battery charging machines, and one of the ringing sets. A second source of storage battery charging current was provided by a motor generator set consisting of a Wagner alternating current motor direct connected to a Holtzer-Cabot charging dynamo. With these machines several reserve sources of exchange current are always available besides that of the storage battery. This battery is arranged to be charged when connected to the switchboard, thereby giving the highest possible efficiency.

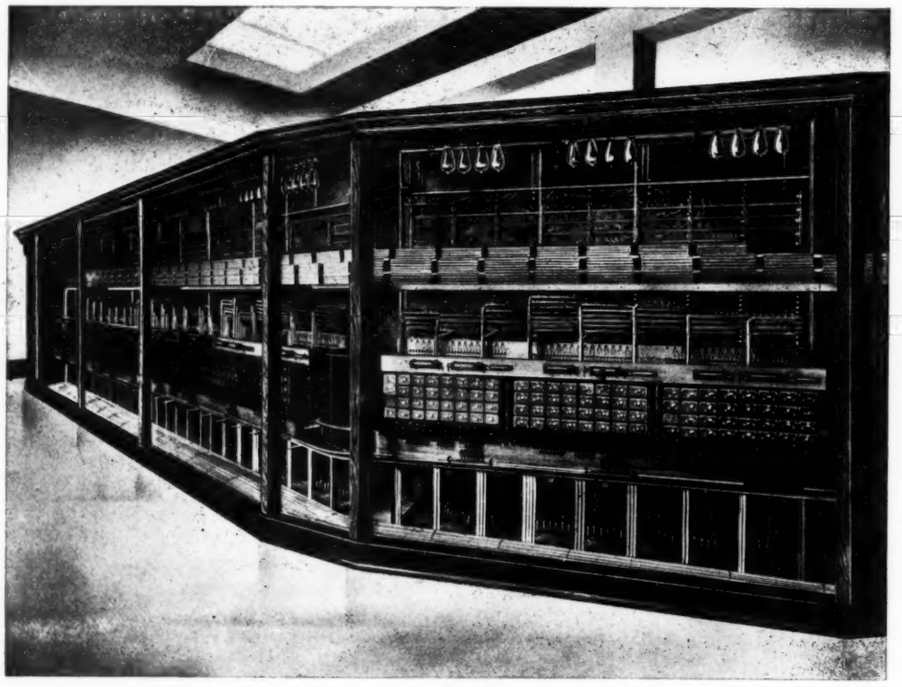


Figure 3.
Rear view of multiple switchboard with doors removed. The answering jack cable run, power connecting rack, cord circuit condensers, cord relays, operator's circuit coils, cord connecting rack, answering jack and line lamp wiring, multiple jack cabling, and resistance lamps for ringing leads are shown in their order of occurrence, beginning at the bottom of the cabinet.

A duplicate set of Holtzer-Cabot multi-cycle ringing machines was originally furnished as a part of the power plant, one to operate from an outside source of current, and the other from the storage battery, but since the installation was completed the latter has been replaced by a new type of ringing device developed and perfected by the manufacturer of the switchboard. This new machine,

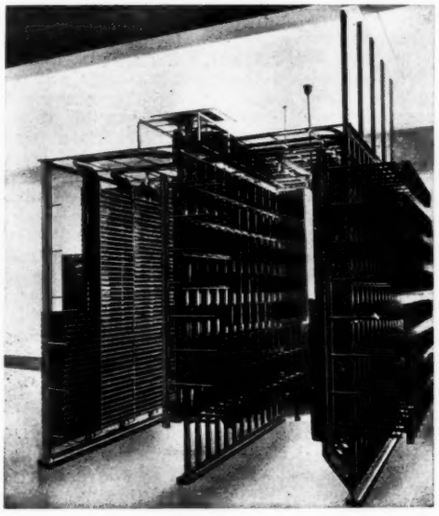


Figure 4.
Relay rack, intermediate distributing frame and main distributing frame.

called a harmonic converter, was installed the first week of January of this year, and has since been running continuously night and day, furnishing all of the selective party line and regular ringing current used in the exchange. As this ringing machine only consumed about one-fortieth of the energy required to operate the motor driven sets, an

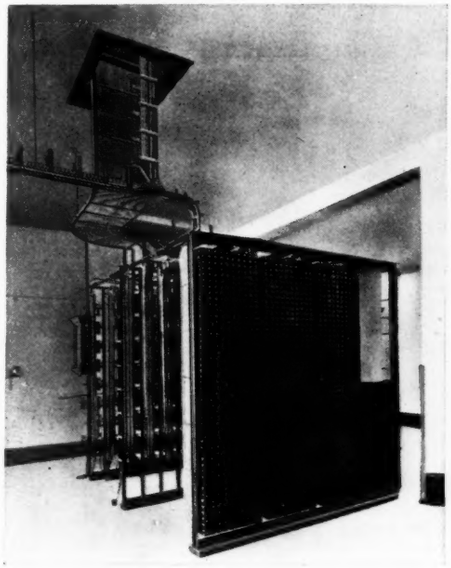


Figure 5.
Distributing frames and relay rack showing the cable run extending upward to the multiple switchboard, which is located on the floor above.

additional economy in the operation of the exchange, over that originally figured, has been made.

In connection with this power plant it might be interesting to note that with an electric meter rent of $4.00 per month, requiring an equivalent amount of current to be used from the outside source of power, and with the cost of gasoline for operating the machine added, the total cost of all electric power and lighting used in the exchange building is equivalent to less than $12.00 per month. Sufficient data, however, are not available to give the total average cost per month during the entire year, but it can be easily seen that it should not exceed $15.00. These figures are based on the operation of 2,200 telephones, which were the total number in service in the month of June of this year.

The central portion of Figure 2 shows a three-panel combination fuse and power board which is so designed as to manipulate all of the power circuits of the entire building. The 110-volt lighting dynamo is provided with rheostats, switches, and circuit breakers on one panel of this power board, and each storage battery charging machine is also equipped with its starting box, rheostats and circuit breakers. The circuit breakers are provided with contacts so that when they are operated an alarm bell will ring, and immediately notify the attendant. The middle panel of this power board is provided with fuses for protecting all of the line and operator's circuits, and also has an alarm so that when any circuit opens the bell will ring and thus notify the attendant.

A peculiarity of the modern common battery exchange equipment is that line and switchboard troubles immediately make themselves known by the improper operation

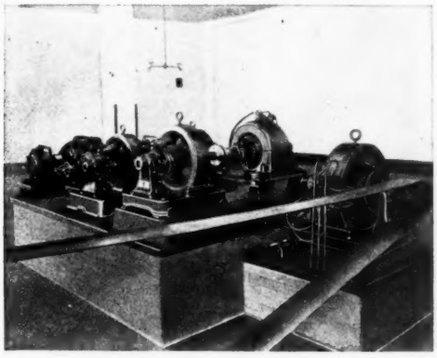


Figure 6.
Ringing machines, charging machines and lighting dynamo. The latter is operated by the gas engine shown in Fig. 3.

of the lamp signals, and thereby forestall many complaints from the subscriber, provided, of course, the troubles are immediately cleared. This is only true, however, of certain portions of the circuits, and in order to completely keep all trouble clear, many novel devices were installed in the Racine exchange to facilitate this work. For example, in addition to a most complete wire chief's and monitor's desk, which are provided with elaborate testing and observation circuits, the main switchboard has provided at each operator's position a complete line and cord testing outfit. The latter allows all of the circuits in each operator's position to be readily tested, proving that the line and cut-off relays as well as the line lamps are operative, also that the cord relays and supervisory lamps are in perfect working condition. The protectors on the main distributing frame are wired to enunciators and an alarm, so that when any heat coil opens the wire chief is immediately notified and the location of the trouble indicated. It will be seen that such devices as these make the modern telephone plant not only easily cared for, but of an extremely high efficiency.

The question of success of a modern plant of this construction when operated in competition with an up-to-date Bell switchboard system is briefly answered, and to the point, by stating that the service furnished by this new equipment has been of such a high order that within a few months time the number of subscribers has been increased from about 1,600 to 2,200. The fact that over two-thirds of these subscribers make use of party line service is an in-

dication that the latter is a valuable drawing card and entirely satisfactory.

The great success of the Citizens' Telephone Company is more fully appreciated when it is remembered that the territory surrounding Racine is sacred Bell soil, and for that reason the fighting methods employed to hold the latter, at the least that can be said, are bitter.

The officers of the Citizens' Telephone Company who have made this modern telephone plant possible, are: J. B. Simmons, president; J. Hocking, vice-president; G. V. Kradwell, secretary; C. R. Carpenter, treasurer; Wm. Van Middlesworth, superintendent. These officials are backed in all of their undertakings by a most enthusiastic board of directors.

All of the central office equipment, as well as all of the telephones for this new installation, was supplied by the Dean Electric Company, Elyria, Ohio, who co-operated with the Citizens' Telephone Company to produce a system which would exactly meet the needs peculiar to conditions. This is one of the first Dean switchboards with an equipment of over 1,000 lines, and considering the fact that every detail entering into the equipment is of new design, its most successful operation reflects much credit on the manufacturers.

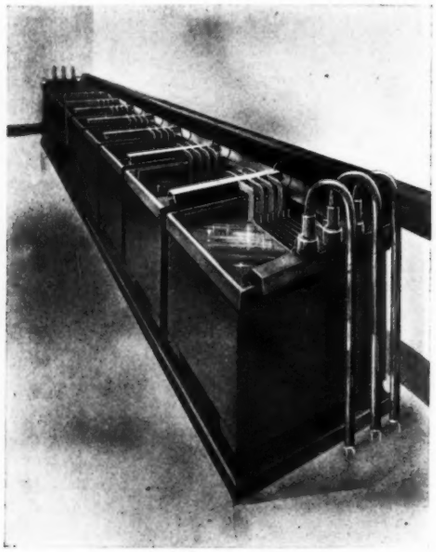


Figure 7.
Storage Battery. The present installation of elements is sufficient for 1,680 lines, while the ultimate capacity of the lead-lined tanks is for 6,400 lines.

The local switchboard employs three-wire line circuits and two-conductor cord circuits, while the incoming trunks from the toll board, over which long distance service is given, are of the three-conductor type, so that the subscriber's line is extended clear of all bridged apparatus, and coils to the toll boards. This gives the best possible condition for long distance transmission and allows the toll operator to completely supervise the connection without help from the local board, except the putting up and pulling down of the trunks. The local as well as the long distance talking facilities of this plant are thus carefully provided for, and when the Chicago and Milwaukee connections are available, which will soon be possible, the Citizens' company will be equpipped to out-talk the Bell in the same degree that it has worsted it in local service.

The combined chief operator's and monitor's desk as well as the wire chief's desk used in the Racine installation, is of the cordless type, using keys to manipulate the circuits instead of the usual jacks and plugs. Designation strips indicate the use of each key, so that this method of operation is more rapid and accurate than the older form.

OFFICIAL BULLETIN NUMBER ONE.

The second series of the International Independent Telephone Association's bulletins are now being issued. Number one follows:

Judging by the actual work done, the convention was the most successful meeting of its kind to date. The attendance—double that of last year—was thoroughly representative, and the enthusiasm could not have been surpassed. From the very start the delegates gave evidence that they were prepared to go after the big things in the Independent field. Credit is due in many quarters to the excellent meeting, but the real cause, the principal reason, was the interest taken by the Independent people engaged in all branches of the industry throughout the country—and we must not forget Canada, who sent an active delegation. It was due in a great measure to their presence that the title and the constitution of the association were changed so as to extend the membership beyond the United States, thus broadening the scope of the work. If the comments heard on all sides are any indication, every one is well satisfied with the convention and the work done during the preceding year. All, we hope, are prepared to render the necessary assistance in carrying on the work henceforth. There is a great deal to be done—our success to date has scarcely more than shown the future possibilities of our organization—but with the co-operation of our members everything is possible; without it, nothing. If the same spirit that made the last convention such a success is manifested by the Independent people during the coming year in assisting their association to accomplish the work undertaken, the results will make last year's achievements insignificant by comparison.

Will the association be the success it should be? You can help answer that question.

In accordance with the change made in the constitution, the association will now be known as the International Independent Telephone Association of America. For convenience the last two words of the title will be omitted in general correspondence.

The general offices will be continued in the Electric Building at Cleveland, Ohio. All correspondence should be addressed to the association here. Independent telephone people visiting the Forest City are invited to pay us a visit.

The executive committee and the committee on legislation and litigation are being appointed and their names will be included in the next bulletin, as well as any special policy which they may decide upon in carrying on the association work.

In accordance with resolutions adopted at the convention, the official report of proceedings will be published in book form at an early date for general distribution. This will include a full report of the banquet and all papers and reports presented at the convention; also a list of all attending, as well as a list of manufacturers and supply dealers, etc., who have contributed to the financial support of the association.

Arrangements are being made to obtain very complete statistics for each state during the coming year. This matter will usually be taken care of by the state associations, but whenever necessary will be handled direct from this office. All Independent companies are requested to render every possible assistance in securing complete and accurate statistics. It will be impossible to accomplish satisfactory results without your co-operation.

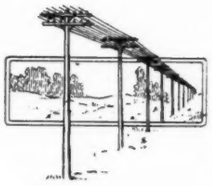
The work of gathering data for our state maps, which was temporarily discontinued for a few weeks preceding the convention, has been actively resumed. If you operate toll lines—no matter how short—and have not already sent in your data, please do so at once. Don't wait for a personal letter. If you have received such letters, respond promptly.

As shown by reports submitted at the convention, the maps can be prepared in much less time and the expense greatly reduced if the Independent people will only give our requests for data more prompt attention. Won't you help us in obtaining better results and reducing the cost?

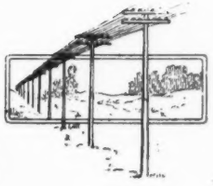
The "shield" has come to stay. The fact was amply demonstrated at the last convention, and it seems to be consensus of opinion that the supply department is the best method of further introducing this emblem and is a valuable feature of the organization. It will therefore be continued. All the present supplies will be handled, besides a number of new "shield" specialties. We will be prepared to furnish everything in the way of "shield" advertising, but in accordance with our policy, previously outlined, will not handle telephone supplies nor interfere in any way with the regular manufacturers and supply dealers of Independent telephone apparatus or equipment.

Among the new specialties handled will be an illuminated sign for exchanges. There seems to be quite a demand for something of this nature and the association was fortunate in securing a splendid article at a low price, which puts it within the reach of all. Particulars furnished on request.

We are glad to note an increased demand since the convention for the standard toll sign. It will pay any company not at present displaying this sign to send us its order at an early date, so as to take advantage of the present low prices. The "shield" is now being used in forty-two states. A new catalogue will be issued by September 10.



INDEPENDENT DEVELOPMENT IN ILLINOIS

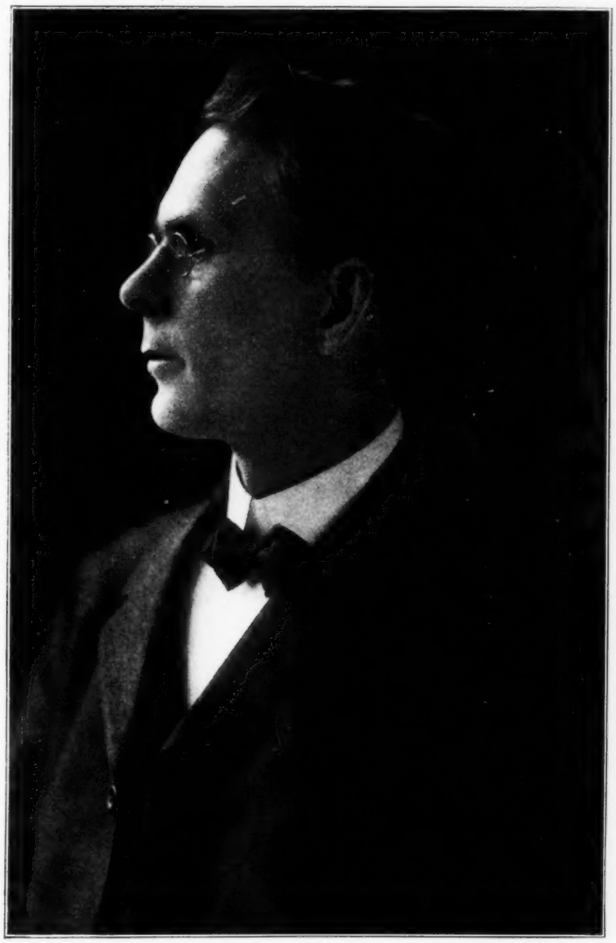


By C. B. Cheadle

[Being an address delivered before the Ways and Means Committee of the Chicago Commercial Association on June 27. Mr. Cheadle is secretary of the Illinois Independent Telephone Association and prominent in national telephone circles. He points out the necessity for Independent connection with Chicago and touches on the telephone development in Illinois.—The Editor.]

YOUR gracious invitation to me and to my associates here I cannot but construe as an honor and compliment to the great Independent telephone interests of our state. On behalf of those interests, gentlemen, I wish to extend to you our sincere thanks. I am not unmindful, either, of the personal gratification your hospitality affords, and for that you have my sincere thanks. Yet I shall feel that the courtesy was rather to the interests which I represent than to me or to those here present with whom I am associated, and I shall feel that my task is not wholly unaccomplished if I shall efface myself and them from your view and lead you to see the things for which we stand and in which we believe.

Had I stood here before you ten years ago I should have been obliged to represent myself only, for the business which I now represent did not exist. I have, therefore, to deal with very modern history, to examine at close range very recent events, to consider very live issues. I shall take as a theme to-day the subject, "The Relations of Chicago to the Independent Telephone Interests of Our Country." I shall not hope to have all the gentlemen here present agree with all that I may say, but I shall comfort myself with the thought that in the statement of facts I shall be exact, and in the statement of opinions reasonable and just.



C. B. Cheadle.

It will be well to recall the fact that no utility contributing to the happiness and comfort of our people was ever so completely a monopoly as was the telephone business prior to the expiration of the fundamental patents upon which it was established. Supported and sustained by a five to four decision of the Supreme Court of the United States most sweeping in its terms, the company controlling those patents had, for twenty years, a monopoly over the transmission of human speech by means of electrical energy, complete and perfect, as no other monopoly was ever complete and perfect.

I need not tell the gentlemen here present the policy of the company thus invested with the power to shape the destiny of our people.

You know the policy of repression that has marked its history; how it made and maintained telephone service in luxury for a few, rather than a necessity of the many; how it made enormous profits on relatively small investments, rather than reasonable profits on an investment that would give to the common people the benefits flowing from such a marvelous invention as the telephone. The policy thus imposed upon the people produced profits to its beneficiaries in the company controlling this commodity the magnitude of which we can only conjecture. In a public advertisement by a large corporation in the daily press of Chicago and New York, some weeks ago, the statement was made that an investment of $100 in Bell telephone stock twenty-five years ago would be worth $100,000 now. This statement, so far as I know, has never been challenged. Certain it is, at least, that the company enjoying the monopoly made the most of its opportunity. At the end of twenty years less than 400,000 telephones were in use in the United States, not one of which, so far as I have been able to discover, was in the home of an Illinois farmer. Only the large merchant, manufacturer or other man of business was able to obtain its service—men who had the means with which to pay the exorbitant price and whose necessities compelled them to have the service. What a striking contrast do we find in conditions to-day when competition has exerted its magic spell! Over 4,000,000 telephones in service, prices reduced, service improved to an extent deemed impossible, the farmer, the mechanic, the common laborer sharing with the merchant, the manufacturer, the capitalist, in the enjoyment of a utility the importance of which is not equalled by that of any other in the world. I will take you into rural districts in Illinois in which practically every farm house has a telephone. I have in mind one township six miles square, in which there is not an incorporated city, town or village, but in which there are 126 farm dwellings, in more than 100 of which there are telephones. You can scarcely find a merchant or doctor in the small villages who has not a telephone. You of the city may smile at the hayseed if you will, but I want to tell you that he has not been slow to avail himself of the benefits of competition in the telephone business, and get good service at low prices, while you in the city have been content to go

on in the same old way paying exorbitant prices for poor service and hoping that some day the monopoly would become converted, repent of its sins, join the church and forever afterwards live a different life. You are still waiting. Gentlemen, you will pardon me I am sure for any apparent reflections upon your intelligence in a little story that I cannot resist the temptation to tell.

A short distance south of your city is another beautiful city, smaller in extent and located upon the banks of a cool stream. Its name is Kankakee. That of the river is the same. Just outside of the city and along the banks of the stream is located an institution wherein are cared for many unfortunate persons of our state. The stream is the favorite resort for fishermen, who come to bathe their brows in its limpid waters and refresh themselves in the cool shadow of the trees that line its banks. One day a man, after spending the day, from early morning until late in the evening, was accosted by one of the inmates of the institution to which I have referred with the question, "Are you catching any fish?" "No." "Have you had any bites?" "No." "How long have you been there?" "Since about eight o'clock this morning." "Say, my friend, you had better come over here with me."

Now, gentlemen, the question is, How long are you going on in this way? Are you going to continue to stand on the banks of the river of progress, fishing, until men question your sanity, or will you break away from your moorings and get into the stream and strive for and obtain the prize that so many, less favored in other ways, have obtained? But, you ask, "How has the farmer and the country merchant worked out this problem whereby he has become so favored?" I answer, "Through individual initiative," just as you, my business friends of Chicago, must do if you are to be favored in like manner.

He has made it his business to see to it that telephone service was bettered, extended and enlarged. He has contributed of his time, his talents, his energies and his means to that end. You must do the same if you are to share in his privileges.

It will surprise you perhaps to know that there is to-day in Illinois more than 400 companies or associations of persons engaged in the Independent telephone business. They have provided the funds, furnished the labor and materials and established for themselves a telephone system throughout the state, far overshadowing that of the Bell monopoly, and all within the space of eleven years. I have positive proof in letters which have come to my possession that the people of Chicago do not comprehend telephone conditions throughout the smaller cities, towns and rural districts, and I am not surprised that this is true when I recall the fact that for every work day during the past ten years there has been $100,000 expended in the United States in building Independent telephone property; that, on an average, one exchange with 1,200 subscribers, requiring the incorporation of three companies with 120 stockholders, has been organized and established each work day; that in Illinois one county has been threaded with telephone lines, 1,500 telephones installed and $13,000 expended every thirty days during the past ten years. When you fully comprehend the facts that I have stated you will begin to realize something of the rapidity of growth and development of this newest of public utility businesses.

There is in Illinois more than 190,000 telephones outside of those owned and operated by the Bell companies. This number is fully three times the number operated by the Bell company in the state if we omit Cook county from the calculation. I have before me reports from the counties traversed by or lying north of a line drawn east and west through the state along the south line of Sangamon county. I have taken pains to obtain from companies operating in these several counties reports of the estimated number of telephones operated therein by the Independent companies, Bell companies and Bell sub-licensee companies, so called. I have cautioned the persons making the reports to exercise care and conservatism in their estimates, and in most cases at least I feel assured the injunction has been observed. Out of the fifty-nine counties constituting the portion of the state above mentioned, nine counties have failed to make any report. Three additional counties have failed to report the estimated number of Bell telephones in service. With these modifications the number thus obtained for the territory indicated is as follows:

Independents—50 counties	123,538
Bell—47 counties	43,282
Bell sub-licensee—46 counties	19,910

The Independents above mentioned are those that have no connection with the Bell toll line, and, therefore, are companies that have not now, nor have they ever had in the past, toll line connection with your great city. The Bell telephones, of course, have toll line connections with Chicago, which is also true of most Bell sub-licensee telephones.

A conservative estimate of the cost of telephone properties in Illinois outside of that owned by the Bell monopoly would exceed $16,000,000. Practically all of this immense sum has been provided by the communities in which the business has been established, the merchant, local banker, manufacturer, mechanic, lawyer, doctor and farmer contributing the sinews of war that have emancipated the people from the tyranny of the greatest monopoly this country has produced. The social, religious, domestic, business, professional and political life of the people is wrapped up in and entwined with the Independent telephone business, so as to make it distinctly the business "of the people, for the people and by the people" of this state, and what is true of Illinois is true of every other state in the Central West, of which Chicago is the great metropolis and commercial center. And when you remember, gentlemen of Chicago, that your city has been and is now absolutely and completely denied a connection with this wonderful system that has grown up while men slept, can you comprehend and measure the loss that your city has sustained annually from such denial?

The country merchant and manufacturer naturally seek the line of least resistance in accordance with a universal law of nature. His business goes out over the channel most available to his command. His telephone at his elbow is the instrumentality through which he reaches his jobber. His goods are ordered, business arrangements made and business life is conducted along the lines of his home telephone system.

If the business men of Chicago could have set down before them in cold figures the loss they annually sustain by reason of diversion of business into other channels that would logically and naturally come to them through an Independent telephone system the conditions in Chicago would not continue as they are any longer than would be necessary to build and equip a competing telephone plant.

And on this subject of competition in the telephone business, I crave your indulgence for a brief season, for upon that subject depends the question of growth or repression in development, completeness or inadequacy of service, efficiency or inefficiency of operation. And on this point, gentlemen, I am very greatly indebted to Mr. Dagger of Toronto, who shares with me your hospitality, for some valuable information and statistics, as well as thoughts concerning the same. I reproduce his words when I say that I know of no place where monopoly, either private or governmental, is giving an adequate telephone service, and I have no knowledge of a fully developed competitive system which has ever failed to receive a larger patronage than that of a monopoly. In striking contrast to the tele-

phone conditions existing in this country, where there is one telephone for every twenty persons, are the conditions that exist in the most enlightened foreign countries where monopoly has fastened its clutches upon this great public utility. For instance, in Great Britain, where the average of intelligence we may assume to be approximately the same as our own, the proportion of telephones to population is as one to one hundred and sixteen; in France as one to 500; in Germany as one to 108, in Bavaria as one to 129, in Austria as one to 734, in Belgium as one to 293. And even in progressive and enlightened Switzerland as one to seventy, while in Norway, where limited competition exists, the proportion is as one to fifty-nine, and in Denmark, under somewhat similar conditions, as one to sixty-nine, while in the city of Stockholm, which is perhaps one of the most striking examples of growth under competition, the proportion is as one to six. In the United States in 1894, at the close of the monopoly period of the Bell company, the proportion was one to 300. But, gentlemen, let us look at this matter at closer range. Let us make it an affair of our own. I go to the writing room of this hotel, step into the telephone booth, and talk to you in your office across the street. For this service I pay ten cents, while as a stranger in your city I ride twelve miles on your electric lines for a nickel. From my office in Joliet I call up Aurora, twenty-two miles away, and for this service I pay ten cents. Six years ago, the Bell company charged twenty-five cents for the same service. Six years ago you paid twenty-five cents to talk to Joliet. To-day you pay twenty-five cents. There is but one company's lines to use. Six years ago I paid $60 a year for six hundred connections, or at the rate of ten cents for each connection. To-day I pay $72 for two telephones with Independent lines, and get four thousand connections, or at the rate of one and eight-tenths cents for each connection. Six years ago I could call any one of ten or twelve toll stations, pay twenty-five cents toll charge and ten cents messenger fee, and talk to any one of a few people in that county. To-day I can talk to any one of thirty-five hundred people in Will county, in his home or place of business for a nickel, and from one single telephone. Six years ago fewer than two thousand persons were directly at my call in Kane and Will counties combined. To-day the Independent system alone connects me with 9,800 persons directly. This magic change has not been wrought by chance, nor have those six short years been a holiday. It has been a fight, gentlemen, a fight without quarter and without favor, with monopoly in its most hideous form on the one side and an aroused and determined people on the other, demanding some measure of the rights that are theirs. Their progress has been opposed by all the influences that unlimited capital could produce, and conscienceless cunning devise. A campaign of intimidation, misrepresentation and extortion has been waged with relentless fury, directed from its fortresses in Boston and New York, and you, gentlemen of Chicago, have unwittingly and unwillingly contributed through the extortions permitted here, to the providing of the means with which to carry on such campaign against your friends and neighbors. They made of the moneys extorted from you a club with which to beat out the brains of your friends, with the hope of stamping out the rising tide of popular demand for efficient telephone service at honest prices. With what success the war has been waged I have in some measure pointed out. One factor was lost sight of, that of an aroused and quickened public conscience. I will trust to the American people every time to do that which is right. It may take time, as it has in Chicago, but Chicago will redeem itself and justify the confidence to which I here give expression. Service has been bettered to an extent deemed impossible, prices have been reduced to a point where service is within the reach of all, and the sum of life's joys greatly multiplied.

But, you say, two telephone systems are illogical, that the telephone business is a "natural monopoly," that two systems are a burden and a hardship on a community, but the fact remains that competition is essential to development. I challenge the statement that competition in this case is illogical. We are all anti-monopolists by nature. There is something in us repugnant to monopoly. Our selfish interests directed along the lines of reasoning may endeavor to stifle and cover up our antipathy toward monopoly, but the feeling is there and will not down. Competition is but giving expression to our natural desires. Show me a city in which an active and healthy competition exists, and I will show you a city whose people have an efficient up-to-date and popular telephone service. Show me a city that has not had competition, and I will show you—Chicago. Need I say any more to gentlemen here? As I was coming along the street this morning, my attention was called to an exceedingly suggestive sign. You have seen it doubtless. It reads: "To the public everywhere: Do you ever stop to consider the present efficiency of the telegraph service compared with what it was before the 'Postal' entered the telegraph field?" I will rewrite the statement and address it: "To an outraged public everywhere: Did you ever stop to consider the present efficiency and extent of telephone service compared with what it was before the Independents entered the telephone operating field?"

With this array of facts, gentlemen, can you, as reasonable business men, question the value of competition in stimulating the growth and development of the telephone business, any more than you would question its value in the development and growth of mercantile, commercial or manufacturing businesses? Would not your question, Why is there one telephone for every five hundred inhabitants in France, while there is one telephone for every twenty inhabitants in the United States, in the light of this knowledge, be on a parity with that of the country schoolboy who wanted to know why the rivers of this country flowed past so many large cities?

I recognize in you, gentlemen of Chicago, representatives of what is to me the greatest city in the world—a city that is the result of individual initiative, intense energy and sterling integrity, that has been and is pre-eminent in demanding for its citizens a "square deal," that has been jealous of its rights, just in its demands, magnanimous to its competitors, and yet which has lain supinely on its back and without remonstrance or protest, been bound hand and foot with the shackles of the most unscrupulous, avaricious and shameless monopoly that ever stifled human endeavor. Your position is a paradox—aggressive, yet neutral; awake, yet asleep; alive, yet dead, shutting your doors in the face of your friends, yet extending the glad hand of fellowship to their representatives. How long, may I ask, will this incongruity continue? How long will it be until you open your doors and say to the users of 200,000 Independent telephones of Illinois, 200,000 in Indiana, 200,000 in Ohio, 100,000 in lower Michigan, 75,000 in Wisconsin, 150,000 in Iowa and hundreds of thousands in other states, with all the local proprietary interests which they represent, and the social, domestic, business, professional and political influences which they set in motion, dominate and control, come and come freely, join hands with the metropolis of the West and the future metropolis of the world, and say to them, We need you, you need us; your aims and desires are ours, ours are yours; let the arteries of communication be not clogged, enlarge and broaden the streams of communication until the fabric of our social, domestic and business life shall be welded into one harmonious whole, and all enjoy without stint the countless blessings which the greatest and grandest empire that the sun in all its course shines upon can bestow.

CONCERNING RINGING FROM CENTRAL OFFICE

By Samuel G. McMeen

LIKE all other principal features of the practical telephone art, that of signaling a subscriber's station has passed through several phases. With almost no exception, subscribers have been called to their telephones by means of some form of bell operated by a current over the line, and while there is a variety of other possible ways of sounding a signal, it is only recently that anything other than a bell has been found to possess enough advantage to be adopted, and this so far only where circuits require a trumpet rather than a bell.

In the earliest installations, as was natural, single stroke and vibrating electric bells were utilized, being operated either by interrupted currents, in the case of single stroke, and by currents interrupted by the bell itself in the case of vibrating devices. The latter is still the usual form in door bell systems, but has the inherent defect that a failure of its contact to close properly, after a period of ringing, leaves the bell circuit entirely open.

At an early stage of telephone exchange development, therefore, the simple electromagnetic bell, either single stroke or vibrating, was supplanted by the polarized ringer, which is to-day the standard form of substation signal. The reason for the adoption of the latter device, which by its construction costs more than the simpler door bell type, is the same reason which has resulted in the development of the common battery system. Long before the invention of the telephone, an effort to eliminate batteries from telegraph lines caused European telegraph engineers to develop a telegraph relay having an armature capable of being thrown to one side by a pulsation of current in one direction, and to the other side by an opposite pulsation. This relay required no spring, and its armature was adapted to lie on either side with equal facility, its position at any time depending on the direction of the impulse which last passed through the windings. An essential part of this relay was a permanent magnet, and it is for that reason that the device was called a "polarized" relay.

The key for use on such a telegraph line was not a mere circuit closer, but consisted of a lever capable of rapidly rotating a small coil between the poles of a strong permanent magnet. Pressing the key down to make a dot or dash rotated the coil quickly in one direction, while letting it up turned it back. A downward stroke, therefore, sent through the line impulses in one direction, and an upward stroke an opposite impulse. The polarized relays in the line imitated these motions, and so could operate recording or sounding devices in a local circuit. No batteries were required on such a line, the energy for operation being produced by the muscular action of the operator at the sending key.

As the early telephone lines were principally private lines permanently connecting only a limited number of stations, it was of advantage to do the signaling between the stations by some means not involving keeping up a primary battery. The need was filled by imitating the telegraph system just described. Such stations were equipped each with a counterpart of the polarized relay, adapted to strike gongs instead of making electrical contacts, and were further equipped with a crank-driven counterpart of the electromagnetic key, except that the coil could merely be rotated in its magnetic field instead of being reciprocated to make dots and dashes.

An almost immediate outcome of this arrangement was the development of a substation generator having a shuttle armature and a stronger magnetic field, enabling rather powerful currents to be placed upon the line. With the gathering of subscribers' lines into central offices, such a generator enabled the operator to ring any subscriber. By enlarging the dimensions and increasing the power of the device, and by driving it continuously by machinery, suitable ringing currents could be produced continuously, these being connected to the ringing keys of the switchboard, enabling each of many operators to send currents from the one ringing source.

With the centralization of lines, the disadvantage of maintaining a battery for ringing purposes became less objectionable, just as the centralization of subscribers' batteries has been found of less disadvantage than the maintenance of many batteries in the substations. In some localities, a convenient steady and reliable source of driving power for a generator could not be found, with the result that batteries were readopted. But a current from a battery directly applied to a line is not capable of operating a polarized ringer, the requirement being that the current shall change direction repeatedly. One tap of a gong results from each change of direction. A natural course, therefore, was to devise the pole changing mechanism shown in Figure 1. The object of this machine was to reverse the direction of connection of a battery to its circuit, and to do this continuously at a predetermined rate. The principle of the pendulum was chosen, with an electrical means for keeping up the motion. The coils *a* and *b*, serially connected, were also in series with a battery *c* and a pole changing switch *d*. The permanent magnet *e* serves as a mounting for the magnets *a* and *b*, polarizing their core ends similarly, and oppositely to the iron armature carried by the pendulum.

It will be seen, therefore, that the pendulum, once set in motion, will continue in motion if the battery *c* furnishes sufficient current, because the pole changing switch serves to reverse the driving current at each stroke.

A similar set of springs and contacts, also carried by the pendulum, continually reverses the connections of the battery *f* with relation to the line. In most of the early pole changers, the pendulum hung vertically.

Two principal objections were found to the use of this device, one being that the current delivered to the lines, if of sufficient strength to give entirely satisfactory signals, caused serious noises in adjacent lines. This was all the more noticeable because metallic circuits at that time had not come into extensive use. The line battery was limited, therefore, to a compromise between being strong enough to ring the bells, and weak enough not to cause too much noise on the lines. A second objection lay in the absence of a convenient and satisfactory form of battery, both for driving the motor mechanism of the pole changer, and for actually ringing the bells. For the latter purpose Le Clanche and other open circuit batteries were unsuitable because of the low resistance at that time. As gravity or Callaud batteries were common for other central office purposes, they were used for both the local and line currents in connection with pole changers.

Because, therefore, of the unsatisfactory primary battery situation, and the noises produced on lines with a sufficiently

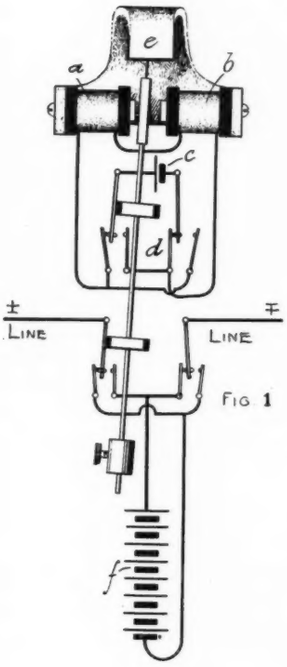


FIG. 1

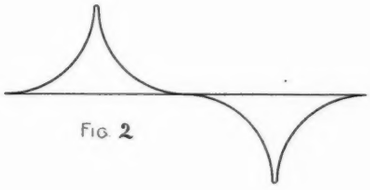


FIG. 2

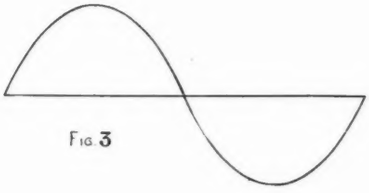


FIG. 3

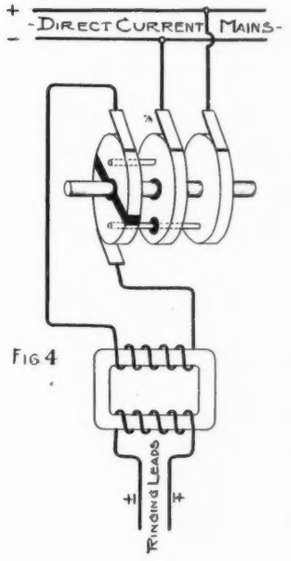


FIG 4

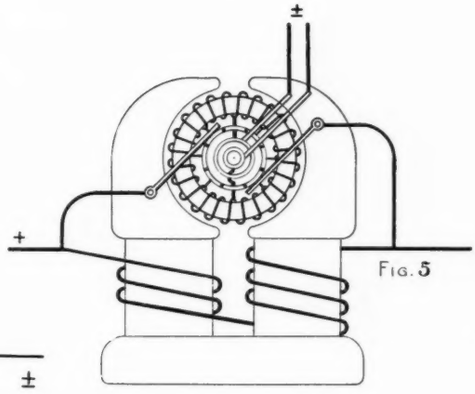


FIG. 5

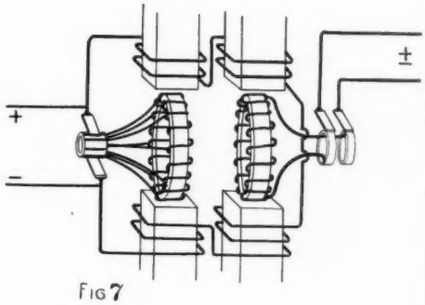


FIG 7

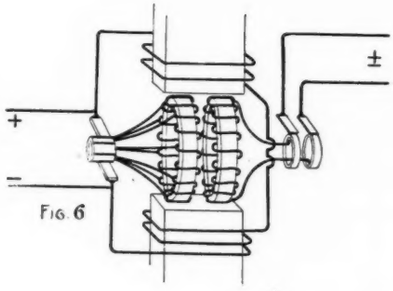


FIG. 6

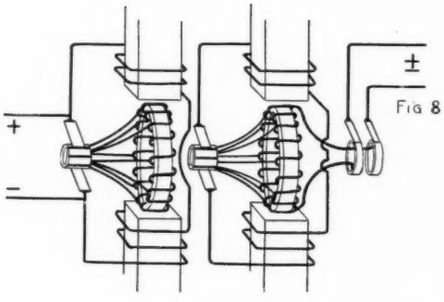


FIG 8

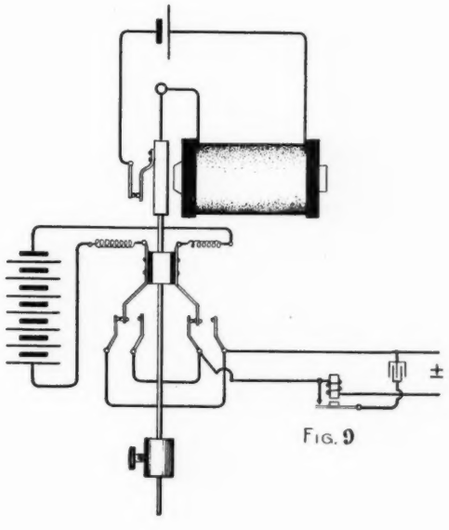


FIG. 9

Diagrams Illustrating "Concerning Ringing from Central Office."

high line battery, the pole changer fell into disuse, being supplanted by the power driven magneto generator.

As the energy which could be delivered by a magneto generator is limited by the strength of the field, and this by the character of the permanent magnets, such a machine required to have many turns in its armature in order to get a sufficiently high voltage. Due to the form of the armature winding, the potential of such a generator rises and falls in a way which is further a disadvantage to its use. Figure 2 shows this rate of change, and it will be noticed that the voltage increases most rapidly toward the end of the increasing quarter cycle. With a given voltage, therefore, the energy delivered during a half cycle is less than with the opposite form of alternating current such as is shown in Figure 3. A test of a number of magneto generators will show that many of them will disclose an even more exaggerated curve than that of Figure 2, and because of the very large number of turns required in the armature to secure the necessary voltage, the armature resistance is so great as to limit the total current to a small value even though the circuit be of low resistance. Furthermore, with a high armature resistance, the use of its output by several operators is seriously impaired, as while one operator is ringing on a short local line, another may be trying, but failing, to ring on a long toll line.

Realizing the need of a source of ringing current having a large output and a low internal resistance, Mr. J. J. O'Connell of Chicago devised the arrangement shown in Figure 4, and it was used with success in Chicago exchanges many years ago.

Current is drawn from the commercial electric light mains, this being necessarily direct current. By means of the commuator c, this direct current is caused to be reversed at the frequency which has been decided upon as proper for ringing bells; this being passed through the primary winding of a converter, alternating current is delivered from the secondary winding. From the secondary leads as many taps as may be desired are taken to the various operators' positions. In a reasonably close degree, with a well designed converter, the current drawn from the electric light mains is in proportion to the current used by the operators.

Experience with this arrangement proved conclusively that there is a great advantage in a single source of ringing current from which a large number of operators may ring without the work of one interfering with that of another. A second step was to produce the machine shown in Figure 5. It consists of a direct current motor, with its usual connections, to which are added two extra commutator rings with a brush for each. These rings are continuous, not being divided into segments as are commutators for direct current motors and generators. Each ring is connected by a tap to the closed winding of the armature, the points of connection of the two rings being diametrically opposite each other. This connection can be seen a little more clearly in the right hand armatures of Figures 7 and 8.

But it is to be noted that, while the office of this machine is to deliver alternating currents, the whole structure is merely a motor with two collecting rings and brushes added. As is true of all direct current machines, whether motors or generators, the current in the armature is alternating. In this case it is alternating at a frequency which is the same as the speed in revolutions, so that by designing the motor speed to be from 900 to 1,200 per minute, the required ringing frequency of 15 to 20 per second will be secured.

Like the O'Connell converter system, this device has the advantage that the current which it delivers to the switchboard is drawn from commercial mains, and in an amount, if need be, much greater than is given by any magneto generator of the earlier type. It has the disadvantage not possessed by the O'Connell converter system, that the ringing current is taken directly from the electric light mains, with associated dangers to persons accidentally receiving the currents, and the further disadvantage of placing a ground upon the electric light circuits when ringing upon grounded lines.

The alternative type shown in Figure 6 combines in a single armature two separate windings, one serving as a motor winding to drive the armature, and the other as a generator winding rotating between the same fields to produce the generator current. This shares with the device of Figure 5 the disadvantage of placing noises on lines rung upon, because even though the ringing winding is in no way connected to the motor winding, it is carried in the same armature with it, and rotates between the same pole pieces. The ringing current, therefore, carries with it the roughness of the driving current, and in some circumstances this causes rather serious disturbance.

A further disadvantage of this type is that its use, for perfect safety, must be limited to relatively low driving voltages, as a contact may occur between the two windings of the armature, and thus, if the driving voltage be high, endanger persons who might receive the ringing current. For the surest safety nothing over 115 volts should be used in such a combined machine, which is known as a dynamotor.

Eliminating the disadvantages mentioned, a motor and a generator may be combined in a single unit, but with separate armatures carried by the same or by opposite shafts. In Figure 7 the field magnets for the two armatures are shown as separate, but as excited by the same winding. The motor armature and both sets of field magnets derive current from the driving source. As the armatures are wound wholly separately, the danger of contact between the electric light circuit and the ringing circuit is almost entirely eliminated, so that even with a voltage as high as 500, sufficient personal insurance is provided. With armature windings separated in this way, the noises superimposed on the ringing current are very much reduced, those which are left being due only to the induction between the slightly varying generator fields and the armature within it.

A final step toward complete isolation of the driving and generating circuits, is accomplished in the arrangement shown in Figure 8. Here the motor is a plain shunt machine, while the generator delivers not only ringing current to this collector but direct current through a commutator to its own fields. It is in effect a self-exciting alternator whose only connection to the electric light circuit is through a shaft which can be bushed in such a way as to eliminate all possible hazard.

The coupling of the self-exciting alternator to a motor, as in Figure 8, is essential when the driving motor is run by alternating current, as in that case the fields of the generator could not be properly excited by the driving current.

The machines of Figures 7 and 8, being composed of a motor and a generator, each are distinguished from the self-contained devices of Figures 5 and 6 by being called *motor-generators,* and a choice between the two forms is principally that of voltage. The motor-generator is suitable for any driving voltage, while the dynamotor is not safe except for a low driving voltage. With either type the disadvantages of the earlier pole changers and power-driven magneto machines are obviated, and ringing current of proper voltage and frequency may be secured from a single machine for a single office, whatever its size or traffic.

All of the machines illustrated are shown bi-polar, and will deliver one complete cycle of alternating current per revolution. The usual speed is approximately 1,000 per minute, although standard polarized ringers will operate to give good signals at frequencies from 900 to 1,200 per minute. When party line systems, dependent upon frequency of ringing current, are to be used, the number of poles per generator is increased. If the shaft rotation is to be sixteen

per second, the use of four poles will give thirty-two cycle current; of six poles, forty-eight cycle current, and of eight poles, sixty-four cycle current.

In the Kellogg and Dean frequency systems, a single motor is made to drive four such alternators, the shaft speed and consequent frequencies being approximately those given above.

In the Bell and Sterling Electric party line systems, where pulsating currents are used, the frequency remains approximately sixteen per second, while the current is commutated in such a way as to leave unused one or the other half of each cycle. The ringing current in that manner becomes a succession of pulsations, all in the same direction, each being followed by a half cycle of no current. In the Bell system, this pulsating current is taken directly from the usual ringing machine, so that alternating ringers receive the full current value, while party line ringers receive only half the total energy because of the missing half cycles.

The Sterling Electric Company's arrangement passes the delivered alternating current through a converter, raising its voltage, and then rectifies it by a commutator on the generator shaft. By this means alternating currents taken direct, and pulsating currents taken from the rectifier, are of practically the same difference between extremes of potential with, therefore, approximately the same total energy developed in the ringer.

But all forms of constantly rotating generators require the presence of a reliable and uniform power supply, which is not always to be had or to be bought at a reasonable price in cities of moderate size. For this reason, on the rise of Independent telephony, a demand re-arose for a satisfactory pole changer. Since the earlier days of pole changer use, the primary battery art had advanced. In the caustic alkali cells of the Edison-Lalande type was available a very satisfactory low voltage, constant current source, while by the much-improved dry battery, and by the rather general use of high resistance ringers, the line current problem also had been solved. Coupling with these advantages some skill in design and circuit arrangement, the pole changer of Figure 9 was produced. This figure shows the generic elements of the Warner machine, in which it will be noted the permanent magnet of Figure 1 has been discarded, the vibrator for the pendulum has been simplified to a single contact, while a relay and condenser have been associated with the ringing leads.

The latter is for the purpose of smoothing up the ringing current, and thus avoiding the difficulty caused by noises on lines adjacent to those rung upon. If the condenser were bridged directly and permanently across the ringing leads, it would smooth up the ringing current quite as satisfactorily as if arranged as shown. But, though the condenser is open to ordinary battery currents, even if of high voltage, it must be remembered that the current from the battery, after passing out of the pole changer, is an alternating one, and the condenser no longer affords a perfectly opaque barrier to it. The relay in series with one of the ringing leads, responds whenever current is used by any operator, and remains actuated so long as current continues to be drawn. The condenser is thus placed across the ringing leads only when needed, and the line battery is saved from exhaustion, which would result if the condenser were not removed during periods of no demand.

The pendulum feature of pole changer enables it to be adapted to different frequencies with great ease; just as a clock may keep good time with a pendulum so long as to beat seconds, while another clock may keep good time and beat four or five to the second, so the pendulum of a pole changer may have its length decreased and its load lightened to produce such frequencies as may be desired. The usual frequency of alternating electric light circuits, as now designed, is sixty cycles per second. This has seemed a rapid rate as compared with telephone bell ringing of the past, but party line bells to-day are being rung with entire satisfaction, and without line disturbances, at a frequency ten per cent higher.

The driving circuit of the pole changer of to-day is in its simplest form, as it embodies the same principle as a buzzer or vibrating bell. Instead of the four contacts of the original pole changer, there is but one, and this in a device of such importance as a pole changer may be made substantial, and with ample strength and platinum, as it is not essential that the cost be limited to a few cents.

It is easy to see that the frequency of vibration of the pole changer pendulum may be regulated through a wide range, and with some exactness, when it is remembered that in vibrating bells the larger the parts, the longer and heavier the hammer, and the wider the stroke, the slower will be the rate of ringing. A vibrating bell may be caused to increase the speed of its strokes by increasing the tension on the armature by setting up the contact point so as to limit the motion and by cutting down the weight of the armature and its hammer extension. Everyone has noticed that a vibrating bell may be turned into a buzzer by removing the hammer, and that when so lightened the rate of vibration is increased. The tone given by a buzzer may be varied within considerable limits by tension and adjustment, the frequency and consequent pitch growing steadily higher as the stroke is shortened and the spring tension increased.

In the distribution of ringing currents to operators' positions, though the source of current be of low internal resistance and the maximum output high, it is essential that some precaution be taken to prevent one operator monopolizing too great a share of the current. This will occur when ringing on a short-circuited line unless special preventive means are used.

Various devices have been adopted for this purpose. In some of them, resistances have been inserted in the leads to an operator's position, which is a successful though not a perfect method. One is inclined to question the advisability of removing resistance from the main source—as has been the effort throughout ringing machine development—and then reinserting it in the various branches to the positions. But such a course is not as bad as might appear, for an internal resistance in the source is common to all branch paths, while this is not true of resistance in the separate leads to positions.

In another arrangement, marginal ringing relays have been provided, inert unless excessive currents be drawn through them, when they operate to lock in an extra resistance. This prevents an operator ringing on a short-circuited line from making the excessive draft which otherwise would result.

The most popular form of resistance for such leads has been an incandescent lamp, as it is compact and not likely to cause fire by overheating. It possesses the disadvantage that it is at its highest resistance when carrying no current and falls rapidly in resistance as the current is increased toward the point when the lamp attains full brilliancy. This is hardly the condition desired in practice, as the ideal arrangement would be one entirely opening the ringing branch when an attempt is made to ring upon a line which is out of order, and upon which, therefore, no successful signal can be sent.

Mr. Claude D. Enochs of La Crosse, Wisconsin, recently has described in a telephone periodical an arrangement which possesses the compactness of the incandescent lamp, but more fully attains the desirable condition. In his arrangement, the resistance medium, which is supported in a vacuum, is not of carbon but of metal. Metals and carbons are conductors, but are opposite in their property of changing resistance with temperature. Practically all sim-

ple metals increase in resistance as they are heated, and all are heated by the passage of currents through them. Only a few alloys have the power of remaining constant in resistance through changes of temperature, and carbon in all conducting forms decreases in resistance with rise of temperature.

Mr. Enochs selects a material which has the power of increasing in resistance at a large rate relative to rise of temperature, and with such a filament in a vacuum, an excessive draft of current when ringing on a short-circuited line will automatically increase the resistance in exactly the way best adapted to meet the abnormal condition.

SEEING THROUGH THE TELEPHONE

A Description of Mr. J. B. Fowler's Televue

By E. M. Rothelle

WONDERS will never cease in the development of the telephone. Preliminary patents have been issued at Washington to J. B. Fowler, of San Diego, California, for what is described as a "seeing telephone," which enables the user to plainly see as well as hear what is going on at the other end of the wire. It is, in fact, a telephone that takes a photograph. Mr. Fowler has named his invention the "televue," while others call it the "telephonescope," but as the device is the product of twenty-six years of hard study and patient experiment the inventor certainly has the right to call it what he pleases. Therefore, it will be known as the "televue."

ermany claims to have a similar telephonic marvel, Prof. Korn, of Munich, a well-known scientist, having perfected an instrument which is said to have successfully stood the tests, and operated satisfactorily over wires covering greater distances, but it is asserted that the American invention produces a more distinct image, or picture, and is, in other ways, a superior instrument. The Fowler "televue" has been tested over a distance of 6,000 feet—more than a mile—and found to work perfectly, the apparatus not only casting a vivid reflection of the scene at the other end of the line, but also reproducing the colors of the objects in the picture. The photographs made by the "televue" do not require that process known as "touching up" to give the shades of color.

Look in the disc, press the button, and, presto! you are looking at a miniature painting of the scene at the opposite end of the wire.

J. B. Fowler,
Inventor of the Televue.

Its projectors confidently declare that the "televue" is destined to revolutionize the art of telephony, and certainly it will be a startling departure to be able to look into the face of the friend to whom one is talking miles away. That this wonderful improvement will become a great boon to many lines of business is equally apparent. One instance will suffice. Mr. Fowler confidently predicts that he can construct an instrument that will enable a train-despatcher to see all the trains on his division at one time, note their movements from one terminal to another, and therefore be far better able to prevent disastrous wrecks.

The cabinet containing the receiving and transmitting apparatus of the Fowler "televue" resembles the ordinary telephone cabinet in most respects. A glass disc, six inches in diameter, for transmitting the image, is adjusted on the face of the cabinet, and the person or object to be reflected at the other end of the line is placed before it. There are one extra induction coil and two extra batteries in the instrument. The receiving plate, whereon the image is shown, is about one and three-quarters inches in diameter. The two glasses are arranged so that the person operating the device can keep his gaze riveted on the lens showing the image of the person at the other end of the wire, and still remain in position before the larger transmitting disc so that his reflection will carry to the opposite end of the line. The telephone receiver is held to the ear in the ordinary manner, and thus both eye and ear are simultaneously employed in communication with the person engaged. According to Mr. Fowler, the visual image in the "televue" is transmitted in the form of a photograph, the successful working of the apparatus depending "upon the variations in the electrical resistance of a ribbon of selenium produced by variations in the intensity of a beam of light impinging upon it."

(Selenium, by the way, is an elementary substance allied to sulphur, its resistance being extremely susceptible to the action of light.)

Engineers who consider the "televue" one of the wonders of the age explain that the secret of the device lies in the correct mechanical and chemical combinations arranged in the construction of the selenium cells behind the glass disc. The light vibrations transmitted to these cells are carried along the specially constructed wire to the instrument attached to the other end of the "televue." At this point the same combination, on a smaller scale, receives and reproduces the exact image or photograph of the objects thus transmitted. During the connection—while the users are talking to each other and looking at each other—the instrument keeps up a low buzzing or humming sound, the electric waves causing an audible vibration as is the case with wireless telegraphy apparatus.

The possibilities of the "televue" in practical service are said to be infinite and its inventor is confident the day will come when it will be utilized in a multiplicity of ways. If, as Mr. Fowler claims, he can transmit a picture a mile and reproduce it as plainly as though it were but ten feet distant, there is nothing to prevent people using the "televue" in their own home to watch a ball game, or a horse race, in progress at a distant park. He has told the time of day as registered by a watch a mile away, and believes that it can also be done ten, a hundred or a thousand miles distant. The possibilities thus opened by the sanguine inventor are nothing short of amazing. The merchant can sit in his home, and by utilizing this unique telephone see the interior of his store and watch the conduct of his clerks during his absence. Deaf mutes can carry on a conversation in the sign language over the "televue" and women

can do their shopping by means of the instrument—even to inspecting the goods and demanding a look at a bargain which the salesman has not taken down from the shelf. From this it is only a step to the time when the physician will use the "televue" to scrutinize a patient's tongue at long distance, and then prescribe the necessary medicine over the wire. In short, the imagination actually runs aground in picturing the limitless uses to which this wonderful device can be applied. In revealing scenes at a great distance, and bringing objects under the direct scrutiny of the observer, although far removed, the "televue" will prove a marvelous invention if it achieves even a tithe of the things claimed for it by its inventor and those who have experimented with it.

Mr. Fowler makes no pretensions that he has discovered any new laws of nature, but contents himself with the assertion that he has been able to arrange and combine the old laws so as to produce new results. His solution of the "seeing telephone," he says, was the outcome of a dream

Miss Daisy Dunlap, Purchasing a Hat Over the Televue.

he had in 1878, but more than twenty-six years of investigation, study and experimenting lies between his vision and final success. The tale of the birth of his idea is as uncanny as the operations of the wonderful machine he has invented. Mr. Fowler asserts he had a dream in which he saw clearly how to construct a telephone that would transmit a view or picture on the same principle that the voice is transmitted. In his vision he saw an instrument consisting of electric wires and glass discs so adjusted that the discs would prepare the picture for transmission over the wires. At the other end of the wires were discs or lenses to receive the reflected views. But, as so often happens, it was only a dream and when he awoke he could not recall the vital features of the device. Mr. Fowler began his experiments at once, and continued his work on the problem as opportunity afforded until he hit on the correct solution. At that time he was employed by the Oregon Railroad & Navigation Company at Portland, Ore.

The "televue" has been examined by many experts who unite in saying it is likely to extend the scope of telephone apparatus to a marked degree. Its ability not only to reproduce images, but to reflect the colors of the objects is one of its remarkable features. Prof. Chas. Tainter, who was associated with Alexander Graham Bell, and with Prof. Bell secured a patent for a photophone, experimented with the "televue," and expressed astonishment at the distinctness with which the Fowler device reflected the images of objects at a distance. He was also amazed at the vividness with which the colors were transmitted. Mr. Fowler announces that he has perfected his instruments so that he is certain they will accomplish all that is claimed for them. Not long ago he secured under contract patents for a loud talking telephone, which he intends to install with the "televue," making it possible for one to sit in his home and hear and see all the sounds and scenes at a ball game or a theater performance.

"I have developed this principle," says Mr. Fowler, "and can install a system of the televue-phone for exhibition purposes, and shall do so. It is my intention, also, to develop the principle still further. What I can do and what I think I can do are two different things, but I can transmit a picture in water colors two inches in diameter one mile or more as plainly as though it was only ten feet away from the eye. I can tell the time of day by an ordinary watch one mile away. I think I can do this a thousand miles away just as easily."

The development of this device will be watched with keen interest, as Mr. Fowler has opened up a field of wonderful possibilities.

NOVELTIES IN TELEPHONES.

The love of display and the desire to have something different from the "hoi polloi prevalent among the newly rich sometimes take peculiar forms. One of the queerest of these is the demand for a telephone different from those in common use. Silver mouthpieces, ivory receivers and hand-carved boxes of rare and expensive woods are some of the elaborations called for. But to all such requests the telephone companies return a polite but firm refusal. Their plea is that the highest price that could be reasonably asked would not repay the time and expense in preparing new designs and providing extra parts. However, where there is a call for a telephone case to harmonize with the finish or color scheme of a certain room telephone companies are willing to make concessions within certain limits. There are four standard woods which the companies furnish, any or all of which will be put in upon demand—oak, ebony, white enamel and mahogany. In some cases boxes have been made of white birch to accord with a very light trimming. But no such luxuries as gold and silver transmitters and receivers and carved and scrolled boxes are permitted.

INDEPENDENTS INVADING NEW ENGLAND.

Independent telephone companies are going after the Bell in New England. A corporation called the Home Telephone Company of Rhode Island is seeking a franchise to do business in Providence, where it will compete with the Providence Telephone Company, a subsidiary of the American Telephone & Telegraph Company.

The Home Telephone Company already has obtained franchises in several of the smaller Rhode Island towns, is capitalized at $2,500,000, and has an authorized issue of $1,500,000 bonds.

Walter H. Trimm, sales manager of the Monarch Telephone Manufacturing Company, was married August 1 to Miss Grace Wheeler of Desplaines, Ill., daughter of Alonzo Wheeler, a retired capitalist. The wedding took place at the home of the bride's parents, and Mr. and Mrs. Trimm are enjoying their honeymoon at New England watering places. They will be absent a month.

TELEPHONE COMPETITION AND MONOPOLY

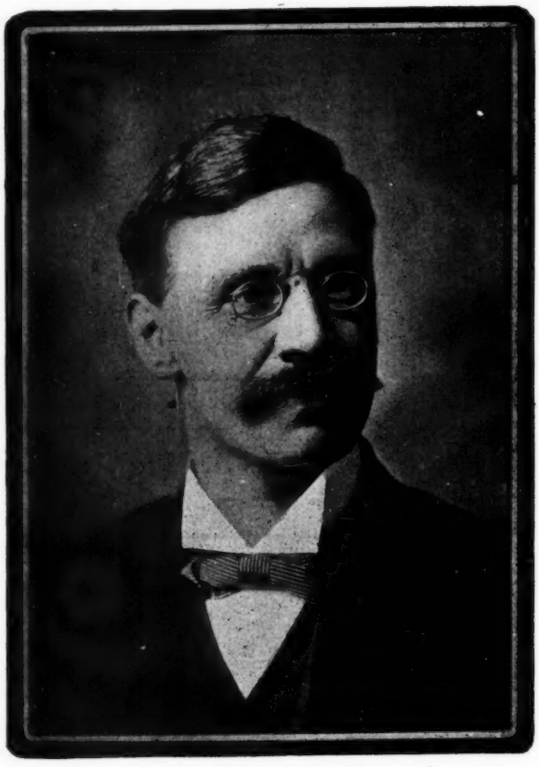
An Address before the Illinois Independent Telephone Association

By F. Dagger

[Mr. Dagger has made a very thorough study of telephone conditions, both on this continent and abroad. He is the telephone expert to the Dominion House of Commons Select Committee on telephone systems, and this comprehensive review shows the benefits of competition, and the detrimental effect of Bell Methods.—The Editor]

IN ADDRESSING you to-day in response to the kind invitation of your energetic and indefatigable secretary, I am open to confess that my presence here is due to the convention, that I would gain more information upon the subject of Independent telephony than I shall be able to impart to my hearers. To me it appears a somewhat novel proposition that a resident of Canada, where the Independent telephone movement is as yet in its infancy, should be called to speak upon this all important subject to a body of men who are responsible for the establishment of a system comprising within your own state more telephones than are yet in operation in the whole Dominion of Canada, including those under Bell control.

While, however, it has not been my good fortune to be associated with the great work so successfully carried on by the Independent men of the United States, I have for the past seven years engaged in a campaign for the improvement of telephone conditions in Canada; a campaign which has resulted in a government enquiry into telephone conditions, the adoption of legislation removing many of the disabilities under which the competing companies were laboring, and, what is perhaps more important, the awakening of the people in every part of the Dominion to the knowledge that the full benefit of telephone service will never be realized so long as the Bell is allowed to remain in undisputed possession of the field.



F. Dagger.

It has further been my lot to be actively connected with the telephone business for the past 25 years, to have watched the development of the telephone service almost from its inception, and to have studied that development both under monopolistic and competitive conditions. I can therefore claim, I think, to speak with some degree of accuracy in regard to telephone matters generally.

My purpose to-day will be to place before you a few facts regarding telephone conditions in various parts of the world, and then to endeavor to show why the United States leads the way in the development of this service among the people.

At the outset I may say that I know of no spot on the globe where monopoly, either government or corporation, is giving an adequate telephone service; i. e., a service which enables the people to fully enjoy all the benefits which should be derived from this method of transmitting intelligence. Further than this, I have no knowledge of any fully developed competitive system which has ever failed to receive a larger patronage than that of a monopoly.

I shall, as briefly as possible, refer to the services existing in the principal countries of the world, where monopoly rules, leaving you to make the comparison with the conditions as you knew them to be here after eleven years of competition.

I would ask you to note the very low rate of development in the countries to which I am about to refer, and to remember that according to the most reliable figures to be obtained there is in the United States one telephone to every 20 inhabitants.

In Great Britain, with the exception of competitive municipal plants in five towns, the telephone service is a monopoly in the hands of the government and the National Telephone Company, the latter a corporation whose 25 years' record is a very little better than that of the Bell. On March 31st, 1905, the development of the British telephone service had only reached one telephone in 116 inhabitants. In London $83 per annum is charged for unlimited service for the first telephone; subscribers having more than one direct line are charged $69 a year for each additional line. For measured service $25 plus 2 cents a call within the county and 4 cents outside the county but within the London area, is charged. Outside the city, ten-party lines are rented at $10 plus 2 and 4 cents a call. The service in London is certainly very bad, the subscribers being unanimous in their condemnation of it. This is mainly due to the fact that the company when it had a monopoly incurred, by its methods, the opposition of the municipal authorities and has never been able to obtain proper right of way facilities, being compelled to use private property, instead of the streets. A few years ago the government stablished a system in London which was to compete with the company, but before the plant was in operation this policy was reversed and the two undertakings are now working as one system under two managements. The government system, being new, with underground conduits and common battery equipment, gives the better service, but in the absence of competition there is no incentive to reach that standard of excellence which is so conspicuous among the Independent companies in the United States.

In the provincial towns of Great Britain the almost universal charge for service is $49 a year for the first telephone and $42 for each additional line. In small places the rates vary from $39 to $42 for the first telephone, and $36 to $42 for each additional line. Where municipal competition exists measured rates are in force, ranging from $25 a year for 1,800 calls to $44 for 5,000 calls. For simplicity I am

giving all these rates in even dollars, although they work out at slightly under the value stated.

You will notice that while these rates may appear low for large towns, no provision is made in favor of the residential subscriber, moreover, the small village and rural district is left entirely out of consideration. This is one of the main causes for the small development of the telephone industry in Great Britain. The equipment of the British telephone systems, with a few exceptions, is of the obsolete type and would be quickly converted into junk by the up-to-date Independent manager over here. In short, the telephone monopoly in England has stifled every incentive towards improvement or extension of the service, with the result that telephone conditions to-day are very little better than they were in the United States before the advent of the Independent movment.

In France, where the telephone is a state monopoly, there is only one telephone to 500 inhabitants. Paris having 50 per cent of the subscribers in the whole country. The rate in Paris is $80 a year, subscribers purchasing their own instruments and contributing towards the cost of installation, a rule which applies all over France. In Lyons the rate is $59; in cities with more than 25,000 inhabitants, $39; and in smaller towns, $30. The service is very unsatisfactory, so much so that in Paris an association has been formed for the protection of telephone subscribers.

In 1905 the German state telephone system averaged one telephone to 108 inhabitants, Berlin with 66,800 telephones having one to 28 inhabitants. The charges are based upon the number of subscribers, being as follows:

	Unlimited a year.	Meas. rate plus 1c call a year.
50 stations	$19	$14.25
100 stations	24	14.25
200 stations	29	14.25
500 stations	34	14.25
1,000 stations	36	18.00
5,000 stations	38	21.50
20,000 stations	41	21.50
Over 20,000 stations	43	24.00

Measured service users must pay for 400 calls a year whether made or otherwise.

Unlimited service is the most popular in Germany, it being adopted by nearly 62 per cent of the subscribers. In Berlin there are fewer than 13,000 measured service subscribers. The central equipments are of an antiquated type, while a large proportion of the lines are single grounded circuits. Continuous service is only given in the large cities, and the operating is slow and cumbersome.

In Bavaria there are 48,000 telephones, of which Munich and Nuremberg are responsible for 22,000, the average in those cities being one telephone to 35 inhabitants. The development of the whole country is one telephone to 129 inhabitants. The rates are the same as in Germany. Three cities operate the common battery system; otherwise the conditions resemble the German service.

Austria with a population of 35,000,000 has less than 50,000 telephones, a development of one to 734 inhabitants. The proportion in Vienna is one to 130, the rate in that city being $40 a year. In other parts of Austria the subscriber must pay an installation charge of $20 for each 550 yards of line, and an annual rental of $20.

The development of the Belgian state telephone system a year ago was one telephone to 293 inhabitants. For telephone purposes, the country is divided into seventeen groups or zones, the rates being fixed for unlimited service within each group. These vary from $24 to $49 a year, according to the importance of the particular group. Continuous service is only given in nine groups. Three cities are installed with the common battery system, the other exchanges are magneto, and there are still a large number of single grounded lines.

Switzerland has one telephone to 70 inhabitants. There is no unlimited rate. The measured service charges are—for the first year, $20; the second year, $14; thereafter, $8 per annum. Calls are one cent each. These rates appear low at first sight, but at twenty calls a day would with the lowest annual charge amount to $68 a year. The subscriber who has much use for the telephone in Switzerland must find it pretty costly. Continuous service is only given in exchanges of over 300 stations. In the smaller systems a charge of from 5 to 10 cents is made for night calls. This is also a state owned service.

I think I have enumerated all the European countries where the telephone service is operated as a monopoly, and I would ask you to note the very low development of the telephone business in those countries, in contrast with that in the United States at the present time. The average development of these seven countries is one telephone to 279 inhabitants, and I would here remind you that in 1894 the Bell companies had 238,000 subscribers' stations, or an average of one telephone to about 300 of your population. Surely no stronger argument can be presented in support of telephone competition than these figures, which I would point out, with the exception of France, were supplied to the Canadian government under the signature of the head of the department administering the telephone service in each country. There can, therefore, be no question as to their accuracy. I could also refer you to the records of other countries, notably Australia, South Africa, Egypt and South America, in corroboration of the fact that development of the telephone business cannot be looked for under any system of monopoly, whether dominated by a government or corporation. I do not, however, wish to weary you with statistics.

In European countries where the long distance lines and larger exchanges are state owned, and the smaller systems are operated by local companies, there is a higher development. In Norway, where the state owns 27 exchanges with 16,000 subscribers, and local companies 173 exchanges and 21,000 telephones, there is one telephone to 59 inhabitants. In Denmark where the systems are operated by local companies there is one telephone to 69 inhabitants. The increased development in these two countries is mainly due to the fact that small towns and villages are operated along almost the same lines as those followed by the Independent companies in this country. The local companies look after the requirements of the rural districts in a manner which no government or great monopoly can ever hope to do. The results are therefore more favorable than in the other countries I have named.

I now turn to the subject of competition in telephones, and would first refer you to Stockholm, Sweden, where the International Bell Telephone Company established an exchange in 1880. Three years later a local Independent company commenced operations and in twelve months had 2,300 subscribers against 900 of the Bell. The government, subsequently deciding to monopolize the long-distance lines, purchased all the Bell exchanges outside Stockholm, and established a system in Stockholm to compete with the local Bell and Independent companies. Conditions remained in this state for some years until the Independent company acquired the Bell system and continued its competition with the State exchange.

On January 1st last year, the Independent company had 31,685 telephones within the city limits or one to every ten inhabitants; and including the subscribers to the government system Stockholm now has one telephone to six inhabitants, which is, I believe the most highly developed service in the world, though it must be remembered that competition has been in existence in that city 23 years;

whereas in the United States the Independent movement is not yet twelve years old.

Outside Stockholm and within a radius of 45 miles the Independent company has 151 exchanges with 6,000 subscribers. This extraordinary development is not yet showing any sign of diminishing, for I find that in 1904, the Independent company gained 6,003 new subscribers.

The Swedish state system had on January 1st, 1905, 74,798 in the whole country inclusive of the Stockholm exchange.

In Great Britain competition by Independent companies in every case resulted in a more rapid development of the service, and in the return of good dividends to the investor. Although these companies, in consequence of the patent conditions existing at that date and the lack of long distance facilities, were induced to sell to the monopoly at very remunerative terms; the experience of this competition proved beyond doubt that the monopoly could not keep pace with the local companies, and that only the refusal of the government to permit Independent companies to do business after the Bell patents expired, enabled the monopoly to perpetuate the discreditable conditions which have existed in the British telephone industry until this day—conditions, I may say, which only a movement similar to that of the Independents here will remedy.

The result of competition by municipalities, which it must be admitted can never be as aggressive as that of Independent companies, proves conclusively that under monopoly there can be no proper development. Glasgow, after twenty-one years' monopoly, had in 1901 fewer than 7,000 telephones; in 1905, after three years' competition, 30,000. Portsmouth in 1902 had 1,012 telephones; in 1905, after three years' competition, 4,611. Brighton in 1903 had 1,100 telephones; in 1905 after two years' competition, 4,000; and I may add that if the splendid equipments, a specimen of which is to be found in the "Interstate" system in this city, and Independent methods had been adopted, these figures could have been doubled.

It is evident from these that the telephone is not, as Bell satellites would have us believe, a natural monopoly. On the contrary, it is impossible to find a community in any part of the globe, without competition, where the telephone is in such general use as to justify the service being termed a general utility. In fact, without competition the people do not become educated to its value as an indispensable adjunct in every department of business and home life. Ask the thousands of farmers using the telephone to-day what they knew of its value, and of the innumerable ways in which it assists them in their daily life, by saving labor, increasing their profits, and improving their social conditions, before the Independent movement brought the wires to their farms and connected them with their market town.

Coming to the question of telephone competition in the United States. In view of the marvelous progress made by the Independent movement in the last few years, it becomes a difficult task to add anything to the visible evidence to be found in every state of the Union. To have built up a business aggregating two and a half million telephones, representing an investment approximating $250,000,000. within the past eleven years, is an achievement almost without parallel in the history of commerce and invention. No better guarantee than this is necessary to demonstrate that this Independent movement has come to stay and that the telephone service of the future will be dominated by the supporters of that movement.

As touching the financial aspect of competition, I may say that during the recent government telephone inquiry in Canada, evidence was obtained from all parts of the United States regarding the result of telephone competition, and statements were furnished by many Independent companies regarding the physical and financial condition of various systems. After a careful analysis of these I am satisfied that it would not be possible to find among a similar number of any other class of industrial undertakings more successful results.

Some time ago I saw a statement showing the dividends paid by forty-one Bell companies in the United States, and in order to make a comparison I referred to the information furnished to the telephone committee, and compiled a statement of the dividends paid by the Independent companies whose reports were furnished to the Canadian government. These reports from forty-nine companies, representing sixteen states, showed an average dividend of 7.65 per cent, whereas the average of the forty-one Bell companies was only 5.2 per cent. These figures undoubtedly indicate that Independent telephone securities have reached a stage where they command the support and confidence of the investing public. More than that, I believe that in the face of present conditions Bell securities must decrease in value, while those of the Independents will attain a higher and more stable position in the money markets as the development continues to grow.

It would appear to me that one reason for the success of the Independent telephone movement is the fact that the Bell monopoly has by its greed and arrogance in the past forfeited the good will of the people. When it was in power it failed to recognize the principle that the accumulation of dollars is not the sole object for which a corporation is created. It overlooked the fact that it owed a duty to the people, in the performing of which it could alone hope to obtain and retain the confidence of the citizens of this great and liberty-loving union.

The permanent success of any nation or institution rests solely upon a policy of justice and honesty. Greed and arrogance have been responsible for the downfall of nations. The destruction of the Roman empire, the decline of Spain, as a world power, and more recently the humiliation of Russia, in the east, can be traced to these causes. As with nations, so with individuals and institutions. Monopoly may pursue its course of extortion and arrogance for a time. but when the opportunity arrives, the popular verdict will hurl the aggressor from its pedestal. So the Bell has been "weighed in the balance and found wanting," by the citizens of the United States, enlightened as they have been by the policy of the Independents.

In Canada also, from the Atlantic to the Pacific, there is hardly a municipality which, having had any dealings with the monopoly or its allies, has not placed itself on record against Bell methods. Indeed, apart from its own stockholders, I assure you it would be very difficult to find its friends. The government of Manitoba has declared open war against the company and last session passed a bill for the establishment of a long distance system, and locally controlled exchanges. The new provinces of Alberta and Saskatchewan are moving in the same direction in a determination to keep the northwest out of the clutches of the monopoly. In the older provinces only the possession of the toll lines permits it to retain its hold on the local business, and if the expressed will of the people were carried into effect, the Dominion government would acquire the Bell long-distance system without delay.

In Ontario within the past three months an Independent long-distance company has been incorporated with a capital of $2,500,000. Rural telephone systems are rapidly spreading all over the provinces, while a number of towns have either municipal or Independent systems, including Fort Williams and Port Arthur, where the development reaches one telephone to ten inhabitants; also at Peterboro, Brantford, etc.

In Quebec, there are already a number of exchanges with about 2,000 miles of Independent toll lines. Much work, however, remains to be done in Canada in the organization of the numerous small companies, the standardization of equipment, the linking together of the rural systems, and

the opening up of the towns and cities. It is, however, only a matter of time when the whole North American continent will be gathered under the banner of the Independents.

No movement in the world's history has a brighter outlook than the one in which you are engaged. It has passed through the stages of doubt and difficulty. It has survived the attacks of the monopoly and its creatures:

"The mighty wrongs and petty perfidy,
The loud roar of foaming calumny,
The small whisper of the paltry few,
And subtler venom of the reptile crew."

It only remains with courage and confidence to carry on the work until every citizen throughout the land shall be supplied with this means of conversing with his fellowmen. I do not see why at the most conservative estimate the Independent development should not reach 10 per cent of the entire population within the next few years. This will require an investment of approximately $600,000,000 and of this you may be sure, every dollar of this money will afford a far more remunerative investment than if the same amount were put into railroads, electric lighting, or any other public utility.

Do not be pessimistic about the future. As you provide the facilities the people will reach out for them. It is not many years since wise men in the Dominion Parliament predicted that the receipts of the Canadian Pacific Railway would not pay for the axle grease. To-day we find two more transcontinental railways hurrying forward construction in a race to connect the Atlantic with the Pacific. This is only one illustration of how we may show timidity in estimating the possibilities of the future.

Above all, do not neglect your farmers. I firmly believe the decline of the Bell is almost entirely due to its refusal to furnish the rural districts with service. I am sure it will prove its downfall in Canada. On the contrary, I am satisfied that your success has been largely due to the development of the rural districts. It will always be so. I think it was Abraham Lincoln who said that all your cities might be demolished to-morrow and new and more beautiful cities would rise above the ruins, but that if your farms were obliterated the grass would cover the streets of your cities for all time. Let your motto therefore be "a telephone in every farm house," and do not rest until this is the practical outcome of your labors. You have already proved what can be done in Illinois. I have had the privilege, as the guest of your president, of driving over many of your farm lines, and also of inspecting the splendid toll lines of the Interstate company, and I can say that no better equipment has come under my notice. I have also inspected several of the Interstate company's exchanges. I have noted the splendid equipment, than which there is none better on this continent. I have tested the service, which is unsurpassed in the United States. I hear nothing but praise of the service and management in all directions. I congratulate you on your president and the able manner in which he has upheld the banner of the Independents in your state. Let the good work go on. Be united. Do not let petty differences weaken your efforts. Present at all times an unbroken front to your opponents. Let your aim be to give your subscribers the best equipment, the most perfect service, the most courteous treatment and no combination of circumstances can keep back the ever increasing tide of your success.

BANQUET OF THE INTERNATIONAL INDEPENDENT TELEPHONE ASSOCIATION, JUNE 27, 1906.

QUESTIONS AND ANSWERS

By J. C. Kelsey

(1) By holding the receiver to the transmitter, why do you get a certain tone, and then upon reversal of receiver or battery, you get another tone, and which of the two will give a better talking circuit?

(2) What is the cause of bells "freezing," by which is meant sticking of armature to pole, and what is the remedy?

(3) Why will a bell that freezes work all right for a time, at least, if it is simply turned over?

(4) Is there any such thing as earth currents that could in any way affect the strikers in a telephone?

(5) Taking it for granted that cores of a striker are perfect, the wire of each the same resistance, magnet of proper quality, and adjustment proper, will that bell ever freeze, and if so, why?

(6) Why is it that sometimes, when you find a bell "froze," by pressing the armature over to the other side it will fly back to the other pole again, and yet by giving the crank a turn, it will not stick to either pole, and turning it again, you will find it will freeze to opposite pole, or back to same pole?

You will please pardon so many questions on freezing of bells, but in twelve years' experience I find on rural lines that the greater percentage of expense is caused by bells freezing. I have never read of a sure cure. Some say to put a brass pin in the pole piece; others say let the clapper strike the bell before armature does the pole; some say to stick wax on the end of pole. Many of these are makeshifts. What I want to know is the cause. If earth currents can or do exist and affect them, what are they, and how can we keep them out? A telephone that will never have a bell freeze is worth 50 to 75 cents more than any other.—S. E. C., Iowa.

Ever since the Iowa convention, this "sticking business" has been on my mind. I have made some experiments, but as yet have not a word to offer in the way of an answer. However, the sticking seems to be most prevalent on heavily loaded lines. It has occurred to me that the fault of this is that the ordinary ringing generator on a heavily loaded line drops off so greatly in pressure that it cannot overcome the residual magnetism—or preferably the polarity—due to the permanent magnet. It then occurs to me that the permanent magnets are too strong on heavily loaded lines. But, then, I cannot see how earth currents would cause the sticking trouble on metallic lines. I want every reader who has had sticking trouble, to write to TELEPHONY and help to get at a remedy. I promise to make more experiments looking toward a solution. It is a serious matter and I need lots of help.

Regarding the different tones made by the reversal of the receiver when held to the transmitter mouthpiece, I undertook an explanation in a recent issue. Following is a letter on this subject:

"It seems to me that the explanation will cover the case exactly, if the difference in sound were purely one of volume; but with the same diaphragm in both cases it would appear that the speed of vibration would have to be changed in order to change the pitch, and I am frank to say that I still fail to see why this should be the case. Regarding the efficiency of the two tones for local and long-distance transmission, I am up against it again. I have made such experiments as are possible with the apparatus and lines available; but the difference noted has been very, very slight, if any. It is possibly the greatest regret that I have that I am not so situated as to be able to carry these experiments to a finish. Pure theory is mighty dry food, you know."

I shall not make comment at this time. Like the sticking question, this is new to me. I showed the two notes at the Michigan and Ohio conventions, and none claimed to have known it before. It certainly was new to me, and strengthened my old belief that there was more to local battery problems than has been realized.

We are using a lightning arrester that works successfully and is made by taking two or three turns of No. 12 wire around the groove on a No. 4 porcelain knob. The other end of this wire is rolled into a ball and planted deeply in the earth. A short tie wire is passed through the hole in the knob and is tied snugly to under side of line wire, which leaves an air space of about one-eighth of an inch for lightning to jump. The line wire can not possibly come into contact with the ground wire. How can I make a solder to place one-fourth ampere fuses to copper terminals? We have had a number of receivers burned out by lightning jumping across the winding of double poles. We have had none burnt out since we have slipped a piece of paper between the poles. Does this affect the sensitiveness of the receiver?—E. H., Arkansas.

I am satisfied that if all lines had such protection as here mentioned, there would be less lightning trouble. The Southern Michigan Telephone Company has generally adopted this method, and Mr. McCoy tells me that particular spots where lightning has always played havoc are now entirely free from trouble. It stands to reason that there should be flood gates for excessive charges. They protect the line. Carbon arrestors protect the instruments. This scheme protects the line and relieves the carbon arrestor, making it doubly effective.

I cannot give you a soldering recipe.

The piece of paper should not impair the effectiveness of the receiver, but it shows poor insulation in the coils. However, I am glad to see the remedy so effectively applied. One who quickly meets and conquers his own difficulties is the real engineer, after all.

I have been reading the different pro and con discussions about lightning effects on telephone lines in Questions and Answers Department of TELEPHONY with interest, and as you have been inviting correspondence on the subject—especially on metallic lines where fire has been set to buildings—I take the liberty to give you an account of fire set to building by lines, although not under metallic circumstances.

Two years ago I was called one afternoon to a little town to look after some telephone trouble, and as a storm approached, was requested to stay over night. About ten o'clock it began to rain, with an occasional thunderclap. To make things clear, I enclose a sketch showing the arrangement of the lines. (See Figure 1.)

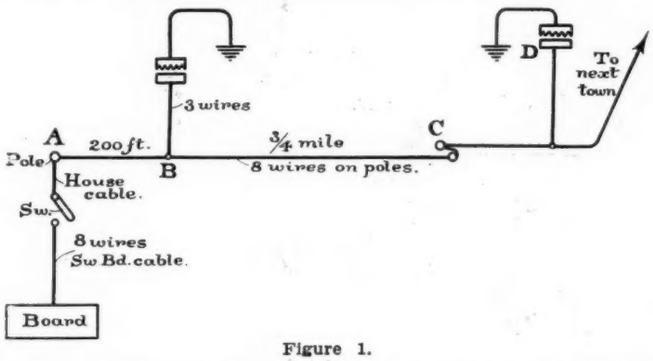


Figure 1.

At *A* there was a toll switchboard. Board cable wires running to about eight double pole single-throw baby knips switches, thence from switches through No. 16 cable, thirty-five feet long to open lines. These switches were installed upon the recommendation of a traveling salesman of a leading telephone house, inferring that upon opening, lightning would not go any farther—a venerable expert on lightning!

At *B*, there were three lines bridged off to a small board protected by a plug pushed through the wall which was to be pulled out before lightning came—the contact spring being away about one-sixteenth of an inch from a serrated ground bar.

At *C*, there was a No. 9 copper wire bridged on a line from one pin to another, eight inches apart, there having before been a series instrument connected into the house.

At *D*, was about the same arrangement as at *B*, only one line entering, the same bridged with copper as at *C*.

Now, some time about that storm I had been sitting in the room at *B*—not far from the telephone—when a good heavy bolt

struck the lines about between *B* and *C*, three-fourths of a mile away. The discharge on the serrated plates in wall box sounded like the discharge of a double-barrelled shot gun. This being the dwelling of the man running the store at *A*, I asked him what he thought about the efficiency of his switches and suggested to look about for safety. Going over at once and looking through the cracks of the shutters, there was that flickering yellow light. We went inside and subdued the blaze—which already had eaten up the cable to the board—a distance of twelve feet, and if it had not been discovered would have consumed the building. You should have seen the switches—burned, bent and twisted out of shape. At *B* everything was all right. At *C* the copper wire was destroyed and at *D* the contact springs were partly melted and grounds were burned away.

I fixed the mess up next day and afterwards put a pole terminal in at *A*.

Now comes another point as to pole top terminals. The house cable must be protected, but I have had one experience where a very bad storm continued for four hours and caused a very disastrous fire and all the fuses were blown in the terminal. Service all gone, and a blinding rain, interspersed with one heavy bolt of lightning after another for an hour or more. Who wants to go up a pole to fix things? Not I! After this incident I have soldered copper wire over the fuse gaps and take chances, down on the end of house cable on doble pole, double throw knives with a serrated plate and a good heavy ground. This has been good practice since 1881, and should do further. There certainly should be protection on the office cable as I have had another experience where the knife switches were closed after a storm and with a clear sky, a clap of thunder, followed by a bolt of lightning and the switchboard was dead—deader than that "Hello of Mansfield," TELEPHONY, May, '06 (page 348). Indeed, lightning is a queer thing, and we will not be able to contend with it until some Edison will have shackled the whole push and use it up at hard work in a commercial way.—A. H., Iowa.

Here is some real experience, and a good man to comment on it. I am sorry that A. H. could not record a metallic line trouble, but as it is, it is a good example of freaky lightning. I have always claimed, and of course my good friend Pardee disagrees, naturally enough, but good naturedly, that a metallic line does not need arrestors at the house. But at the cable pole there should be plenty of carbon arrestor surface to help off the discharges. Now A. H. rather disagrees about the cable pole arrestors, on the ground that he would not care to keep running out to them in a protracted storm. These are points all right, and I agree about the use of copper in place of fuses, when they run as high as six amperes. I believe one of our so-called experts has declared for fuses that high in resistance. I want to say that a six-ampere fuse is no better than a No. 6 wire, if you want to save anything.

I look at this lightning question this way. There was a time when it was dangerous to go into the telephone business because lightning would often wipe out the plant. That was in the grounded service days before the greedy Bell considered the public, or before they anticipated the trolley line. I honestly believe that if it had not been for the trolley and Independent competition, there would be nothing but grounded lines to-day. Consequently, we would still have lightning trouble. But a short metallic line cannot get into trouble because it has such a small surface and cannot accumulate disruptive charges. Therefore, I hold that city metallic line needs protection only at the cable box. I am very willing to be moved out of the position if the readers will look around and send me a record of all metallic line trouble they have ever seen. That will help to solve the problem partially.

A St. Louis judge, during the hard times, refused to convict a man, arrested for snatching a purse from a lady's belt, on the ground that she should not have tempted him to grab the purse. Maybe, the lightning has some of these features. It will strike where it is tempted to.

In the January number of TELEPHONY, 1906, page 34, you speak of using the phantom circuit; a grounded line phantomed over a metallic line, where one stated that these coils would cost about $16, and another one speaks of doing it for about $2.

I want to say that this is not a new thing with me, as I have had a farm line phantomed over a metallic farm line for two years, costing me $1 for one line to install, less labor, which is very small. These lines have never given me any more trouble than other lines.

The duplexer that I use, and have made, never can be burned out by lightning. I expect to put in more of these this summer, as we have put it through a long test, and find it a success. The lines I have working on the ground has 17-1,600 ohms bridging telephones and I can ring all of these fine. On the metallic line I have 12-1,600 ohms bridging telephones. I would like to hear of any one who can duplex his lines any cheaper and do that amount of work and keep it up. I would think that the coils used would be apt to burn out by lightning and give trouble in that way. One has to understand lightning and give it his attention. I have always given it my personal attention to make it a part of my work, and find that it pays to watch it. I think that it is as strong one place as another. I am also working on a lightning arrestor that would give better service than any we have on the market at the present time.

We have about 400 farm telephones and not to exceed two or three telephones burn out in a season.

I have always been interested in TELEPHONY and the Questions and Answers, and have never written anything or asked any questions, but thinking that I had been duplexing for some time with success, would like to have the people know about it.

Electrical work is a pleasure to me; therefore telephony comes natural.—G. W. K., No. Dak.

I have seen the duplexer mentioned by G. W. K. and it is certainly a good one. The use of two lamps at each end, with wall sockets, would certainly be a cheap proposition. G. W. K. takes two incandescent lamps, 16 c. p., bridges them across the metallic line, and taps the middle point, connecting it to a line jack in the switchboard. It gives excellent service. At the other end, of course, there is a bridge of two lamps, and the middle point tapped out to the line. It looks as if ringing would be weakened, but in this case it seems not. It certainly makes a good phantom talking circuit.

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1. Why is it that iron offers more resistance to a flow of electricity than copper?

2. Please explain as plainly as possible the difference between amperage and voltage.

3. Please explain how the third circuit is made of two metallic circuits by the use of a phantom coil. Give me a diagram of it, if possible.

4. What is the best ampere fuse to use in a cable box connecting a lead cable of No. 22 gauge?

5. After making up with new zincs and coppers and three and one-half pounds of blue vitriol and leaving on a short circuit for twenty-four hours, my four gravity batteries only show up .6 of a volt. What is the trouble with them? I used rainwater.—M. J. C., Ohio.

1. Iron offers more resistance to electrical currents than copper because it is a magnetic material and copper is not. All materials have a certain conductivity, and copper has the higher carrying capacity. Silver is better than copper, but there are not many of us who contemplate its use. If copper keeps on the up grade, we will have to take the copper lines inside over night and lock them up.

2. Amperage is a measurement of current flowing. When we speak of one ampere, we mean the current which will flow when a pressure of one volt is acting on a resistance of one ohm. This is Ohm's law, that the current, or amperes, is equal to the electromotive force, or volts, divided by the resistance, measured in ohms. The word voltage, indicates a force or pressure. When the standpipe has 100 feet of water, the water gauge indicates a pressure of forty-five pounds. That is nothing quantitative, but simply a force. The dry cell has a voltage of a volt and a half, but that indicates only a force, or a pressure that we can depend upon to make a certain amount of current flow through a certain amount of resistance. The bigger the water pipe, the bigger quantity of water will flow from the same pressure, because the resistance is decreased. I once heard an electrician testify that the trolley wire was most dangerous to life when the "amperage" was greatest. This was foolish, because a high current usually indicates a drop in voltage, and would be less dangerous. A man is killed by amperes. The reason that 110 or 500 volts will not kill is that they cannot force enough current through the body.

But if a person was connected for hours across fifty volts he would die. So we get in the habit of saying that one thousand volts will kill a man. It is really the current due to one thousand volts that will kill. If you were knocked down by water from the standpipe, it would not be the pounds pressure that knocked you down, but the water, rather, or the current of water.

3. A third circuit is made from two metallic circuits, by bridging a balanced impedance across the metallic circuit, and tapping the middle points. In the questions above, G. W. K. takes two incandescent lamps and puts them across each end of the line respectively. Between each of the two lamps, he connects a grounded line. You could use eight lamps, put two across each end of the metallic circuits and by tapping the points between the lamps, you would have a third metallic circuit. Ordinarily, repeating coils are used, or in some cases, 1,600-ohm ringers, with their middle point brought out.

4. I suppose a two-ampere fuse will not be too large. If you really want to protect, put in half-ampere fuses.

5. Your batteries, after being short circuited for twenty-four hours, are very likely to show a low reading. Why do you let them run on short circuit so long? I would think that an hour, or less, would be better.

We have a lamp line toll board which is operated by 12-volt storage batteries. It is intended to work from this 12-volt current throughout—I mean the transmitters, etc., as well as the signals. We have tried various makes of transmitters of the high resistance type and place them in series with a 75-ohm retardation coil and a condenser—(1 m. f.)—bridged, and various types of induction coils with the result that none are satisfactory on account of the weak transmission. Some are better than others, but it is out of the question to get the transmitters to talk up and they are unfit for long distance work. The current consumption is very good indeed. We had a booth telephone made by one concern that had a central energy transmitter used with the result that it was excessively noisy and impossible to use. Now what I want to know is whether this scheme is possible or not. On taking the matter up again with the Bell engineers, they admit they never did do it, and why it is they will all say that it is easy and then fail is more than I know. Some two years ago I had this same thing up and at that time the engineer for the Stromberg people said he didn't believe it possible and I was inclined to think him mistaken, but am almost persuaded that he was right. At that time we secured a transmitter that would not heat on eight or ten volts and yet we had gained nothing, for the talking was not as good as with a three-volt transmitter. We did not use any extra resistance in circuit, but I am not able to state exactly as to current consumption, though think it was within a reasonable limit. I am not thoroughly acquainted with central energy telephones, but am led to think they are not as efficient as the old local battery for long distance work, although we do have some fair work from them. I have had better results from two cells of storage battery than anything else—this for both local and long distance. In our case, the actual measurement of the current is above 12 volts, for the reason there are six cells of chloride accumulators and they are kept well up. On a good transmitter the actual amount of difference between two and four volts in the primary does not show well in work. I cannot help believing there is not perfection by any means in any of the ordinary transmitters. The Bell transmitters work nicely, but take considerable current and are bad to pack, but can packing be entirely eliminated?—J. C. M., Missouri.

The transmitter service on operators' position is not as good in common battery as in local battery. There does not seem to be a real reason, yet I have secretly changed from standard local to standard common and have had all the long distance operators within 750 miles kicking on the transmission. They could not be fooled, so I concluded that local was better. If a transmitter of high resistance could be used across your twelve-volt battery, in series with an induction coil primary, you would then have the same conditions as the standard local. But with a single battery there are fluctuations of battery pressure every time any operator or subscriber speaks. The induction coil primary will not give sufficient impedance to stop the fluctuations, hence the need of an external coil. Of course, one cannot talk through an impedance coil, hence the condenser. In your case, it is possible that your one microfarad condenser is not sufficient to neutralize the lagging or distorting effect of the coil. I think you will soon find a transmitter that will give you service on a common battery system, with the impedance. This impedance guarantees freedom from noise and cross talk.

If you will remember, when you were here I spoke to you in regard to the wireless telegraph. You said that there was no possible way that we could be disturbed. Well, I do not know whether it is here yet, but we have been having trouble since a station in Colorado has been installed. We were not bothered with it before that installation was made. Of course, we do not get it on our metallic lines that are well balanced, but on lines where not free from defects we get quite a disturbance. Down at Hutchinson they have caught some complete messages and have looked them up, and it seems to be wireless. Now how can you account for the trouble? I cannot get any cross talk through any other cause than paralleled wires—buss bars being of a high resistance. I have had some trouble with operators being able to hear talk on the board with all keys closed. Will storage batteries get sluggish and cause this trouble?—B. B. H., Kansas.

Your telegraph message must come from earth currents or the ordinary Morse currents. The fact that your metallic lines do not show noise seems to verify it. To prove it is wireless, listen on your metallic lines by strapping them together, and put in a receiver to ground. If you are intercepting waves, this will tell you. Voice currents are so feeble and require such a heavy net work to get even an electrolytic cell to operate, that it seems impossible for your reception of wireless telegraphy. Also, only those circuits running north and south for any distance would intercept the waves. Regarding cross talk and operators hearing without keys, I think your batteries are in bad condition, either have high resistance due to sulphatation, or have a great amount of sediment in the bottom of the jars. Clean them up, and charge them to 2.6 volts each.

Will you please answer through the pages of TELEPHONY what we can do in order to overcome the trouble we are having with a metallic telephone line? This line is well put up on a cross arm on a transmission line (three phase) carrying 11,500 volts. The line in question is just five feet below the transmission line or wires and is transposed every fifth pole and connects with a bridging drop switchboard at each end, the distance between the two being eighteen miles, but it only runs on transmission poles nine and one-half miles. At times we can talk very well and then again it is impossible, in fact the current is so great that we do not feel safe to handle line under these conditions and we are sure there is no direct connection with the transmission line. We also have another line of the same kind on the same poles, but the full length of the transmission line, that gives us fair service. Can you help us out of our trouble?—P. F. S., Virginia.

Your trouble is due to electrostatic induction, caused by a state of stress, due to a leaky insulator on the power circuit. As long as the power circuit is clear, so is the telephone. This telephone is a sensitive detective and can tell a power man more about the conditions of his line than can a good lineman. With a slight leak on the power wires, the noise in the telephone is slight. The noise in the telephone varies as the leak on the power wires varies. With a metallic alternating power system, even a grounded line should be quiet, but when the one wire of the power circuit gets closer to earth than the others, you are tending toward an alternating trolley condition, which is bad.

Not very long ago, I was in a town where I noticed that the magneto common return system was very noisy. This was very unusual, as it is normally quiet, with all the power house output turned.

I was asked the trouble, and answered that the alternating power circuit had a bad ground on it. The power man, being notified, gave a merry laugh. He did not realize that a ground on one of his high tension wires was a worse strain on his power system than on the telephone system. So he let it go. I had the pleasure, let us call it pain, of hearing that the next night, he burnt out a big armature, caused by a short circuit, due to two grounds, one on each wire of his system. When he found those

grounds and started up again, the telephone lines were quiet.

A power man is a fool, who will not heed the warning of a buzzing telephone which tells him so plainly that he is on the way to trouble. The only help I can give you is to clear up the power circuit, and see what is causing the unbalanced condition.

You could remedy the trouble by bridging your metallic lines with 1,000-ohm coils, and grounding the middle points. This will remove the static stress, make your line safe from shock, and should quiet you down. But the best way is to get at the source of the trouble. To put in the coils would be like taking morphine for acute gastritis. It would deaden the pain, but the sickness would remain.

I have often talked of alternating trolley conditions. Some of these days the heavy brain workers will wake up and find a great lot of noise on their systems.

If your telephone lines had as good insulation as the power circuit, static stress would not hurt. But you have one insulator weaker than the rest. As the induced pressure on the telephone line increases, which is earth seeking character, it soon rises to the break down point of the defective insulator and allows the charges to run from the line unequally, hence noise. If you put in the bridges and tap the middle points to earth, the charges find the earth before they pile up to the breaking capacity of the weak insulator. Hence the charges are handled without noise.

Your one line, which seems to be better than the other, inasmuch as it is less noisy, indicates better insulation than the other.

DECISIONS AFFECTING TELEPHONY

By Gilbert W. Hand

AUTHORITY TO PLACE POLES ON HIGHWAYS IN ILLINOIS.

THE Supreme Court of the above state has recently decided a case relating to the respective rights and duties of companies and highway authorities in the erection by the former of telephone poles along highways. There is a legislative provision as follows: "When a telephone company desires to construct its lines upon a public road or highway, it shall give the highway commissioners having jurisdiction over the roads or highways sought to be used by it ten days' notice of such intention, that said highway commissioners shall, within ten days after the service of such notice, specify the portion of said roads or highways upon which said telephone line may be placed, and it shall be the duty of said telephone company to construct its line in accordance with the specification of the highway commissioners; but, in the event that the said highway commissioners shall fail, for any reason, to make such specifications within the ten days after the service of such notice, the said company, without such specifications having been made, may proceed to place and erect its said line along said highway by placing its poles, posts and abutments so as not to interfere with other proper uses of such highway." The Interstate Independent Telephone & Telegraph Company complied with the first provision as to notice to the highway commissioners of Towanda of its desire to place poles on the highways within the town. This notice was properly served at a regular meeting of the commissioners but they, not understanding the import of the notice sufficiently, decided to delay the matter until their attorney could advise regarding the proper course to follow. The attorney gave notice protesting against the use of the streets in any manner by the company, but saying that if the use were to be exercised that the poles should not be placed more than one foot from the outside line of the roads. This action was not taken at a regular meeting of the board. The company later erected its poles, placing them ten or twelve feet from the outside of the streets. Suit was thereupon brought for alleged obstruction of the highway. The lower court held that the notice to the company where to place its poles was invalid, and gave the company the right to place its poles where it desired but said that such placing by the company must be such as would not obstruct the highway. The defense set up that before the company should be called upon to pay damages for the alleged obstruction it should have had notice to remove the poles. This notice was not given. The points of law of interest are summarized in the following quotation from the opinion: "This statute clearly does not indicate an intention of the legislature to surrender the use of the highways of the state to telephone companies, but the use of the highways by telephone companies remains subservient to the use by the public of the highways of the state, and the lines of the telephone companies, when placed in a public highway, must be so placed as not to interfere with a proper use of said highway. If the commissioners having jurisdiction over a public highway sought to be used by a telephone company specify the portion of the highway to be used . . . and the company occupies such portion, the company would not be liable to any penalty for obstructing the highway. If, however, the commissioners have not specified the location and the company places its lines in the highway, it clearly acts at its peril and is bound to so place its lines as not to interfere with the public use."

Interstate Independent Telephone & Telegraph Company et al. v. Town of Towanda, 77 N. E. 456.

AUTHORITY TO REGULATE RATES IN NEW YORK.

The Glen Telephone Company of Gloversville, Fulton county, was sued by Horton D. Wright, a practicing attorney of the above city, on a claim by the latter that the company was unlawfully discriminating against him in the matter of its rates for telephone service. He alleged that a certain franchise between the city and the company was in force and that under its terms he was entitled to a much lower rate of service than that offered by the company. The matter turned directly upon the question whether the franchise in question was a binding contract on the company and under which Wright had a right to claim a benefit. It is unnecessary to recite more of the facts and the following statement of the law is clear in declaring against Wright's claim: "Plaintiff's contention, that he is entitled to service upon the terms stated in the so-called franchise given to the defendant from the city of Gloversville, is, we think, not sound. The right to construct its line along and upon the highways is given by statute in section 102 of the laws of 1890. The municipal authorities of the city of Gloversville are only given the right to 'regulate the setting and stringing of telegraph, telephone and electric light and power, and other poles and wires in the city.' The power of the municipality is simply a police power, to be exercised for the protection of the citizens. It cannot use that power for the purpose of forcing a contract with a telephone company for benefits to itself or its citizens." In quoting from the important case of Farmer v. Columbiana County Telephone

Company (Ohio), 74 N. E. 1078, it was said: "Telephone companies organized in this state obtain power to construct their lines along the streets and public ways of municipal corporations from the state by virtue of revised statutes . . . and not from the municipal authorities. The latter have the power . . . to agree with such companies as to the mode of use, and upon compensation for such use, but not beyond what may be necessary to restore the streets to their former state of usefulness. They have not power to exact or receive compensation by way of free telephone service for themselves or their citizens, or to fix rates for telephone charges. Where such power to so obtain free service, or to fix rates, is attempted to be exercised by the passage of an ordinance incorporating such provisions, the company will not be required to adhere to them by a court of equity . . . even though it be shown that the rates agreed upon . . . were so fixed at the solicitation of the company, and that the company obtained a benefit which it would not have otherwise obtained, in a mode of use of the streets more beneficial to it and more convenient to the public." The New York court in affirming the foregoing said: "If this be sound law the franchise can in no way be a contract binding upon the defendant as to compensation for service, for lack of consideration. The defendant cannot be estopped because it has complied so far with terms with which it was not required legally to comply. No harm has been done this plaintiff or the municipality and I can see no element of estoppel in any act done by the defendant under the terms of the so-called franchise."

Wright v. Glen Telephone Company, 99 New York Supplement, 85.

NO LIABILITY FOR INJURIES FROM BLUNTED PIKE POLES.

The Supreme Court of California recently had a case before it in which the following were the facts: The United Electric Gas & Power Company had furnished certain of its employes a number of pike poles of the ordinary kind and in good condition and the poles had been in use by the linesmen for some time, sufficiently long to dull the pikes. One Towne was engaged in raising a certain pole with one of these blunted pikes and in the performance of such work the pole slipped off the pike and fell and injured him. Suit was brought for damages but it was held on appeal to the above court that there was no duty resting on the company to furnish an inspector to keep the pike poles sharp, and that it was not liable for injuries if it had discharged its duty in the first instance of furnishing pike poles in reasonably good condition. This decision rests on the principle of law now so generally recognized that the master need not inspect small tools such as the servant can examine for himself and is as fully able to judge of the condition as the master and in fact often is the only one who knows of their real condition. The master has discharged his full duty if he furnishes a tool like a pike pole or shovel or hammer in reasonably good condition and is not liable for injuries occasioned as a result of the ordinary wear of the tool.

Towne v. United Electric Gas & Power Company, 70 L. R. A. 214.

MESSAGE FROM INDIANA TO BE DELIVERED IN KENTUCKY —WHICH LAW GOVERNS.

A very interesting law suit in which the Western Union Telegraph Company was defendant was recently heard by the Kentucky Court of Appeals in which the facts were that one Lacer had delivered a certain message to defendant for delivery to his brother at Louisville, Kentucky. This message not having been promptly delivered to the addressee, suit was brought by the Kentucky party for damages. The evidence disclosed the circumstance that the actual error in which the addressee's name was changed and the message made impossible to deliver occurred in Indiana. It is a well established rule that where a contract is to be performed, partly in one state and partly in another, the law of the place of the breach of the contract will govern the liability. The Indiana law holds that there is no liability for mental anguish for failure to deliver messages, but the Kentucky rule is the reverse. Hence, the importance of determining whether the law of Kentucky or that of Indiana should determine the liability of the defendant. While the case was against a telegraph company the rule as hereafter declared is equally applicable to telephone companies and on account of the novel question presented in determining whether the actual breach consisted in per se failing to deliver, or in the act of the defendant's agent in making the mistake which prevented the company's agent at the receiving point from delivering, the discussion by Justice O'Rear is here set forth: "But, argues appellant (the company), the performance in this case was in course of execution in Indiana where the contract was made, when it was breached; i. e., when appellant negligently altered the address so as to allow it to miscarry. The thing contracted for in this case was not to carry property but to do a service. The service which was contracted for was to expeditiously deliver the correct message to the addressee at the point addressed. . . . Transcribing it into the characters of the Morse code, or otherwise, temporarily rendering it unintelligible to ordinary persons, . . . would not affect the contract or any rights of the parties, so long as it was in due time correctly communicated to the person intended. The message consisted of intelligence to be transmitted partly by electricity and partly by messenger, so that it would quickly reach the person addressed. . . . It was a single undertaking, the performance of which was to take place in Kentucky. The delivery of the message, the communication of the intelligence to the person named, was the thing to be done. The contract is not different in this feature of its nature than if A. undertook to go in person from Boonville to Louisville and there find B. at a given point and communicate to him a message from the sender. Whether A. en route forgot the message or forgot the name of the person to whom it was sent would not be material as affecting his liability in the undertaking. If he, in fact, found the person and told him the true message, the contract would be satisfied. But his failure to deliver would be a breach of his undertaking, which could not occur till he failed to deliver at the place and within the time contracted for. . . . We are of the opinion that the appellant's liability on the contract in suit is to be measured by the laws of this state, where the breach of the contract occurred."

Western Union Telegraph Company v. Lacer, 93 S. W. 34.

TELEPHONE POLES ARE AN ADDITIONAL SERVITUDE IN NORTH DAKOTA.

A case decided sometime ago has settled the rule in the above state in regard to the matter of additional servitude on city streets in the affirmative. May 11, 1906, a rehearing in the suit of Cosgriff et al. v. Tri-State Telephone & Telegraph Company, requested by the company, was denied, affirming a previous decision in the same controversy, deciding the question as to rural highways, thus establishing the law on this important matter in North Dakota. It is unnecessary to recite the facts and the following excerpt from the opinion contains the important conclusions: "This court held after mature deliberation and an extended review of the authorities, . . . that the construction of a telephone line upon the streets of a city imposed a new servitude upon the fee of the abutting owner, for which he was entitled to compensation. The rights of a land owner whose land abuts upon a rural highway are not inferior to those of one

whose land abuts upon the streets of a city. . . . Indeed it has often been held that the rights of the owner of the land abutting upon the streets of a city are more restricted. (This is the New York rule and the cases deciding it have been discussed in previous issues of TELEPHONY.) . . . Cases like this primarily involve a determination of property rights, and, where it is held that a new servitude is imposed, it follows necessarily that the fee owner is entitled to relief. The point of difference, and it is the only one which can logically serve as the basis for a different conclusion, is as to the original purpose of the grant of the easement. Rights which have been granted to the public cannot be claimed by the abutting landowner. Such rights as have not been granted to the public remain in him and should be protected to the same extent as any other property rights. . . . Some courts have held that the primary and original purpose of the dedication of a street or highway includes the transmission of intelligence as well as public travel. (Pierce v. Drew, 49 Am. Rep. 7; People v. Eaton, 100 Mich. 208; Cater v. Company, 60 Minn. 539; McCann v. Telephone Company, 69 Kansas, 210; Kirby v. Company, 17 S. D. 362.) . . . The authorities are nearly uniform, however much they may differ as to reasons, that telephone lines are not within the scope and purpose of a rural highway (basing the decision that they are not an additional servitude on the broader and more advanced conditions of the country necessitating a yielding to the public welfare).

"The North Dakota case above mentioned goes to the extent of holding that when a different use of the streets becomes necessary 'the rights of the fee owners must yield to the public good,' and that the new use must be deemed to have been compensated for in the original appropriation or dedication. We cannot assent to this view. . . . If telephone companies require the use of private property for the construction of their lines, they have the power of acquiring it by condemnation, but they may not, in our opinion, lawfully take it without first making compensation."

Cosgriff et al. v. Tri-State Telephone & Telegraph Company, 107 N. W. 525.

DUE CARE ON PART OF PERSON CROSSING STREET.

The following language appears in a recent case from Georgia: "It is not negligence, as a matter of law, for a pedestrian to cross a public street at a point where there is no cross walk. In doing so he may assume a greater risk from passing vehicles and animals using the main thoroughfare than he does when passing over a cross walk, but he does not in doing so assume any greater risk from obstructions other than those necessary for the use of some public utility, such as water plugs, telegraph and telephone poles and the like. Even a telegraph or telephone wire, placed so low on a sidewalk or street that a person using the street might come in contact with it, would be an obstruction."

Southern Bell Telephone & Telegraph Company v. Howell, 53 S. E. 577.

INJURIES FROM BLUNT PIKE POLES.

An interesting case in which an electric company was sued by one of its linesmen for damages, was decided some time ago by the Supreme Court of California. One Towne was employed by the company in the above capacity and had been for some months previous to the accident to him. He was one of a gang of four under the superintendency of one Bevens who had directed the linesmen to strip wires from and remove certain poles. Towne knew the character of the work required of him, the dangers and the fellow servants employed with him. They were furnished pike poles of ordinary length, one end having an iron ferrule and pike to be used in bracing and to keep him from falling while the wires were being removed. Plaintiff knew that this was the ordinary method employed to prevent accident. The pike poles were of the character and construction ordinarily used, but the end of one had become dulled or blunted and was unsafe.

Towne was directed by his superintendent to climb a certain pole. Another was directed to brace the pole with a pike on the unprotected side. Towne's associate picked up the blunted pole and forced the point into the pole and rested the other end upon the ground. While Towne was so engaged the blunt pike slipped off and he was thrown to the ground and severely injured. These facts were the basis for the following statement of law by the above court in regard to the liability of the company for the injury: "The only act of negligence claimed is that the defendant allowed the pike pole to become dull or blunt at the point. If the defendant was guilty of negligence or want of ordinary care it is liable; otherwise not. Negligence is a breach or ommission of a legal duty . . . It was the duty of defendant to furnish suitable tools and appliances to plaintiff for the work in which he was engaged. It was found that the pike poles furnished were of the character and construction ordinarily used for the purpose for which the same were to be used, therefore, there was no negligence in furnishing tools with which the work was done. If the pike pole became dull it was as much the duty of the plaintiff and his fellow servants as it was of defendant to have had the pike sharpened and repaired, provided a means were furnished by defendant with which such repairs could be done. It is the duty of employes to use ordinary care and skill and it certainly is the duty of an employe to know when tools with which he is working have become dull or in need of repair. Having eyes he must use them and being informed he must act on information. If one of the pike poles furnished by the defendant had had the point broken off by the plaintiff and his fellow servants in taking down the very first pole, and if they had used the same pike pole with the broken point on the next electric pole, and damage had been caused thereby, would it have been the negligence of the defndant? Would defendant have to have one man employed for the special purpose of watching the points of the pike poles and another for the purpose of watching each guy rope and another for the purpose of watching the steel points attached to the shoes of the climber of poles? We think that a reasonably prudent employer would have performed his duty by furnishing proper pike poles, and that a reasonably prudent employe would not use a pike pole after the point had become dull and blunt."

The above statement of law without doubt contains the rule which would be followed in every state, and, with reference to the above case itself, is an application of the well-known principle of law that the master has fulfilled his full duty to his servant, with reference to small tools, by supplying them in a reasonably safe and fit condition for the purposes to which they are to be put, and the servant is charged with a duty thereafter of seeing to it that such tools are kept in a proper condition.

Towne v. United Electric Gas & Power Company, 70 L. R. A. 214.

A TELEPHONE DIRECTORY.

What the modern telephone directory means to a large city is not realized by many people. The employes of the New York Telephone Company began the work of delivering the new summer telephone books and collecting the old ones recently. About 200 men are employed for this task, which takes about four weeks to complete, and means the handling of about 800 tons of paper. The new directory contains the names of over a quarter of a million of business houses and individuals. Three hundred and sixty-five thousand books will be distributed.

THE TELEPHONE SYSTEM OF TODAY

By C. J. H. Woodbury

Abstract of a paper read before the Engineers' Club of Philadelphia

THE remarkable development of electricity applied to the service of man for illumination, conveyance of power, and transmission of speech, during the ten years following the Exposition in 1876, at Philadelphia, is an illustration of the aphorism that "progress always advances by leaps," and was probably without parallel in human history excepting the development of Grecian art in twelve years from a condition of mediocrity to the Golden Age of Phidias.

It is always pleasant to record improvements and advances in any state or condition. The trite phrase that "electricity is in its infancy" is a time-honored one, having been used in 1792 by George Adams, philosopher and optician to His Majesty George the Third, in "An Essay on Electricity Explaining the Principles of That Useful Science," in which he states, on page 35, "As electricity is in its infancy when considered as a science, its definitions and axioms cannot be stated with geometric accuracy."

C. J. H. Woodbury.

EARLY ATTEMPTS AT TRANSMISSION OF SOUND.

The endeavor to communicate sounds by vibrations is not a new one, the string telephone being described by Dr. Robert Hooke, in his book on "Outacousticons," in 1667. Over a century earlier the transmission of vibrations to a diaphragm was applied during the second siege of Rhodes, in September, 1552, as related in the "History of the Knights of Malta," by Major Whitworth Porter.

In this siege the Turks sank shafts and drove galleries beneath the principal bastions. Gabriel Martingo, a Venetian engineer in charge of the fortifications, excavated pits into which he inserted long rods, against the upper ends of which he placed a drum, and the vibrations of the earth in the tunnels made by the Turks were transmitted to drumhead, which enabled the Knights to determine their location and to sink countermines and destroy the advance of the enemy in this manner.

As an example of the wish to extend the limits of speech, by means of electricity, reference is made to "Harper's Magazine," for June, 1867, where it is related, on page 131, that after a telegraph office was burned, an instrument was temporarily installed in a carpenter's shop. One noon the instrument clicked vigorously, and the carpenter placed his lips to the instrument and shouted, "Operator's gone to dinner; be back in half an hour," meantime receiving a shock in his lips which served for remembrance.

This man had the desire, thought, and conception in his endeavor to apply electrical apparatus to the transmission of speech, but he did not accomplish his purpose and failed to produce an invention.

There is nothing new in the conception that eventually something would be produced to add materially to the range of the human voice, but invention is a practical result in the victorious solution of a new problem and is not a futile attempt or a passing wish.

Humanity has always desired to add to the potentiality of the voice, by attempts to extend the range of utterance, but the masks of the Grecian actors, speaking tubes, and stringed diaphragms were of as little purpose as signal fires, tom-tom beats and semaphores, and the full measure of the strength of the invention of Alexander Graham Bell is shown by the fact that the telephone stands as the only successful result after centuries of effort.

THE TELEPHONE INSTRUMENT.

When one removes the telephone from its hook and presently holds conversation with another person in the same building or in a distant city, there is set up a train of action possible only under the concurrent action of science and handicraft, labor and capital.

It may be worth while to trace some of these steps and the results to which they are tending in modifying methods of life in business and personal affairs.

The telephone system ministers to the needs of civilization in lengthening the potent life of mankind by the utilization of time.

Your consideration is asked for the telephone system, rather than for the telephone as an instrument, an invention which is the most delicate piece of philosophic apparatus yet made by man, in that it is operated by less energy than any other contrivance.

It transmits in miniature the infinitesimal overtones which indicate the character of sounds, the individual quality of a voice or the source of a tone, through the whole range of vibrations far beyond the limits of the human ear.

Yet as an essential portion of the general subject, something should be stated relative to the methods of its operation.

The telephone differs from all other electrical devices in that it is the only electrical appliance which does not require skill on the part of its users. It is equally the servant of all; a polyglot, it speaks all languages and acts as a faithful messenger for the whole gamut of sounds.

While this device is of the utmost simplicity in its construction, yet the phenomena of its operation are based on

a complexity of principles, some of which can be explained only on the basis of a hypothetical framework.

The action of the telephone is based upon two fundamental principles.

First, the relations of electricity and magnetism are of such reciprocal nature that if a closed coil of insulated wire is wound around a magnet, variations of magnetic strength produce corresponding undulations of electricity in the wire, and the apparatus is to this extent a generator of electricity; and, conversely, if the electric current traversing such a coil is varied, the attractive power of the magnet is changed in like manner.

Second, the attractive power of a magnet varies with the distance of the armature from its poles.

When a pair of telephones are connected together, the ends of the line wires are attached to the terminals of the coils surrounding the poles of the magnets in the telephones, and when the sonorous vibrations of the voice are directed against the soft sheet-iron diaphragm of the telephone, its vibrations produce corresponding undulations in the strength of the magnet, and this in turn generates variable electric currents in the coil wound around the magnet, and thence throughout the whole electric circuit of which the coil at the other telephone forms a portion, and at this other telephone the undulations of electricity produce like changes in the strength of the magnet whose varying power causes the diaphragm to vibrate in unison with that of the first telephone, and to give forth in miniature a repetition of the sounds which were imparted to the first telephone.

Telephones were formerly used in this manner without a battery, and while the transmission was clear even to distances of 500 miles, yet the sound was "as weak as the voice of a seared conscience," and hardly equal to the commercial requirements of public service, particularly amid the rumble of cities, and could be used only where there was absolute quietude.

The telephone is no exception to the general experience of the retrospective simplicity of a great invention, and while its operation has been described, no one has yet been able to explain why the telephone talks.

Even if the diaphragm is removed from a telephone the magnet and coil of wire remaining will give forth speech whose vibrations it receives; also a condenser, even when crudely made by inserting sheets of tin-foil between the pages of a pamphlet, will produce sounds in like manner.

While the telephone was an invention of radical novelty, made without the assistance of precedents to govern its assemblage, yet its degree of perfection is such that it has escaped improvement, and is to-day in its entirety as produced by Alexander Graham Bell.

THE TRANSMITTER.

The former method of using a pair of telephones transmitted speech with the utmost clearness, but of such minute volume as to be inadequate for satisfactory service amid disturbing noises or for long distances, and the transmitter was invented for the purpose of producing greater variation in the undulations of an electric current applied to the telephone circuit than could be done by the application of magnetism in the telephone.

This result is accomplished by applying electricity from a battery, and changing the conductivity of this circuit in unison with the vibrations of sounds imposed upon a diaphragm, without the intervention of magnetism to produce such variations in the current.

The general purpose of the transmitter may be compared to a method of varying the flow of water conveyed through a soft rubber tube by intermittently constricting its diameter by applying changing pressures upon it at some portion of its length.

Its electrical principle is based upon the fact, well known to every telegraph operator, that the contact of a telegraph key with a well-defined pressure is necessary to obtain a satisfactory flow of current through its connections; and the transmitter in general use applies this principle in a more delicate manner, by using a number of loose particles of material whose conductivity is improved by pressure which increases the points of contact.

Each end of the telephone circuit is attached to one of a pair of discs of carbon, between which are a large number of granules of hard carbon, and as the pressure upon these carbon discs is increased, the conductivity of the circuit and the flow of electricity is augmented accordingly.

In the transmitter, the center of a flexible diaphragm presses slightly upon one of the carbon discs, and the fluttering of this diaphragm alters the pressure upon the carbon granules, and, therefore, their conductivity in the electrical circuit of which they form a portion.

This variable electrical current is conveyed by the telephone line to the coil of wire already described in the telephone used as a reciver, and through its influence the changing strength of the magnet is varied more than could be done by the original method of using a telephone to transmit speech.

There are many variations in the form of transmitters, and in fact every loose or variable electrical connection may in the light of the present state of the art of telephony be made to serve as a transmitter.

Piles of nails, boxes of coke, watch-chains, metal turnings or filings, toy balloons covered with powdered plumbago, coils of wire, plumb bobs touching a surface of mercury, streams of conducting solutions, and arc lights have served such purposes by way of experiment, while in place of the thin iron diaphragms, boiler heads an inch thick, iron plates two inches thick, the side of a frame house, and even that of an iron steamship have been used as diaphragms.

It appears incomprehensible that such rigid bodies should flutter at the sound of a human voice to an extent which would permit them to convert such vibrations into electrical undulations which form the initiative of the electrical transmission of speech, and the only explanation of such experiments is that molecular vibrations are important elements in the unexplained phenomena of telephony.

The brief outline of some of the elements of the telephone and the transmitter should not induce one to overlook the fact that intense scientific research and able mechanical skill were necessary to develop these instruments to an efficiency which has enabled the transmission of speech without skilled usage even up to distances reaching nearly two thousand miles.

The telephone would have remained a piece of physical apparatus, an example of the correlation of forces, an instrument to aid in the study of sound, and a wonder to all, had it not been for the production of the switchboard, and particularly the Blake transmitter, which saved the situation in the development of the telephone system.

Before tracing the operation of the events set in action by the removal of the telephone from the hook, let us follow the lines from the instrument to the switchboard in the latest type of the telephone system.

PROTECTORS AGAINST FOREIGN CURRENTS.

On the way from the subscriber's instrument if any portion of the wires are aerial, protectors are inserted in the line for the purpose of maintaining the service and defending the instrument against other electric currents imposed upon it by possible contact between telephone wires and those of electric lighting or power circuits or even lightning, any of which would disarrange the delicate wires in a telephone, some of which are so fine that three and nine-tenths miles would weigh only a pound, and these protectors are so sensitive that they would shut from the telephone the battery currents used in telegraphing; and in like purpose the other ends of the lines at the telephone central stations are equipped with protectors to exclude the whole range of

electric currents applied for lighting, power, the numerous signaling systems, and also lightning.

The form of apparatus used by the Bell telephone companies consists of a device inserted in each line wire which is threefold in its nature.

The first element consists of a fuse made of an alloy which forms part of the circuit, and is contained in a tube of vulcanized fiber.

These fuses will deflagrate when exposed to currents of seven to ten amperes, the capacity of the fuse being varied according to the type of the apparatus.

The next element consists of a pair of small blocks of carbon whose larger surface measures about one by one-half inch, and one of these blocks is connected to the telephone circuit. The corresponding block of the pair of carbons is separated from it by a perforated sheet of mica and is electrically connected with the earth. A small cavity in one of the opposite faces of the carbon is filled with a button of solder such as is used in automatic sprinklers, and which melts at 160° Fahrenheit.

The distance between these carbons is such that electricity at over three hundred and fifty volts will pass from the carbon connected with the telephone circuit across this space to the opposite carbon and thence to the earth, thereby relieving the telephonic apparatus of electric tension exceeding three hundred and fifty volts.

Thus, if the foreign current exceeds the carrying capacity of the tubular fuse, its deflagration opens the circuit at that point. If, however, it is less in volume than the carrying capacity of the fuse, and over three hundred and fifty volts tension, it leaps across the thin space separating the carbons, and thence passes to earth. The resistance of the tiny arc in the space between the carbons is sufficient to slightly warm the carbons and cause the fusible metal to flow from its recess and fill the space between the carbons and thus establishes a conductor of low resistance to earth.

This diminished resistance generally causes a sufficient increase in the current imposed upon a line to cause the tubular fuse to deflagrate and open the circuit, if it did not do so on the first occurrence of the contact which imposed the foreign current on the telephone circuit.

In order to protect the fine wires of the telephonic apparatus from injury by currents which are too small to operate the tubular fuse, and of too low tension to pass to earth through the carbon cutouts, a third element, known as the heat coil, is employed, in which a fine German-silver wire which forms a part of the telephone circuit will be heated by a current of one-sixth of an ampere to a temperature sufficient to release a conductor ordinarily secured by fusible solder, and pass the current to earth. This latter device is not used at the subscriber's end of the line in those modern types of telephonic apparatus in which the circuit is normally open, except when the telephone is in use, because such coils are an interference with the best conditions of telephone service by adding to the electrical length of the line, and if a foreign current came in contact with the telephone line at a time when the instrument was in use, it would produce noises to such an extent as to absolutely prevent the transmission of speech, and the user of the telephone would naturally place the receiver on the hook and thereby open the circuit.

The result of this protective apparatus has been so successful as to establish conditions of immunity in the Bell system of telephony against mishaps to the apparatus resulting from foreign currents and lightning after an experience of many years throughout the Bell telephone system. Such a telephone office appears to be, like a locomotive, the safest refuge in a thunder-storm. Notwithstanding the number and range of location of telephone central stations, it has not been possible to obtain information of any injury by lightning to any person in such a place.

TELEPHONE LINES.

Following the course of the lines from the subscriber's instrument, the aerial wires are of copper which has been treated by the hard-drawn process, as commercial copper is too ductile and has but little of the elastic property of resilience by returning to its original length when stretched by a load of snow or by a low temperature.

Hard-drawn copper might be classed as one of the modern inventions which the ancients stole, if the accounts of early implements may be accepted, but investigations showing that bronze had been supposed to be copper have absolved these people of anticipating the work of Mr. Thomas B. Doolittle, who produced hard-drawn copper by omitting the annealing during the latter part of the process, and obtained copper wire which retains the electrical conductivity of commercial copper, while its tensile strength is doubled, and it is divested of the tendency to continually stretch under its own weight.

The substitution of hard-drawn copper wire for iron wire formerly in use has increased the limit of the telephone conversation under other equal conditions about four times, and by its better conductivity has diminished the waste of electricity used in telegraphy or electric lighting and transmission of power, or, what has been more important, has extended the limits of their application.

For local use, these wires are generally one-tenth of an inch in diameter, and for long-distance lines, larger wires about one-sixth of an inch in diameter are used.

The contact of these wires with those of other electrical circuits used for lighting or for power, to which reference has been made, is not the only difficulty, for the mere proximity of other wires conducting these powerful currents will, if they are of changing polarity, produce sympathetic currents by induction in the telephone wires, and, acting on the telephone, are the occasion of various noises which at times interfere with the transmission of speech through the telephone, furnishing examples of wireless telephony which are impediments to the usual service.

This interference by induction is minimized by transposing the telephone wires to various positions on the cross arms, so that the result will be neutralized by imposing such conditions of position that these disturbing elements will counteract each other.

The wires of underground cables are laid in twisted pairs so that they are immune to inductive influences.

An aerial line is subject to the attack of all manner of disintegrating conditions—poles decay and break, branches fall from trees and wreck the wires.

It is as unfeasible to make a pole line equal to stress of weather beyond peradventure as it is to make the rigging of a vessel equal to the impact of all storms, for when a sleet storm builds the wires to icy lines, three inches in diameter, sail is set for the gale to sway the lines until the poles are broken.

During a recent winter, the destruction of aerial telephone, telegraph, and electric light lines in the New England states was estimated to be greater than the loss of shipwreck on the New England coast.

This breaking of lines has been prevented on local wires whenever it has been feasible to substitute aerial cables, each containing a number of wires, in place of the open wiring; but for long-distance and toll wires it has been neccessary for electrical reasons to retain open wires.

The gales on the summit of the Rocky Mountain passes are so severe that neither poles nor lines will withstand the stress of winter weather, although lines have been built with poles set only fifteen feet apart, yet the sleet builds them up to large dimensions which yield upon the impact of winter gales.

Communication, however, is permanently carried on along these routes by means of submarine armored cables which have been buried in trenches excavated among the rocks.

In addition to the facilities for concentrating forces for immediate repair in case of wreck, the lines are inspected by a patrol to give forewarning of imminent breakage.

These men brave the wilderness and face the elements through sun and through storm, from the miasm of southern swamps to the rocky fastnesses of western ranges, in the rigors of heat and in cold, all in order to give every assurance of human power that the response will be made when the telephone is taken from the hook. As in the other services of civilization, it can be truly said of the telephone service: "When we taste the spices of Arabia, we do not feel the scorching sun which brought them forth."

Difficulties with aerial wires are by no means confined to those occurring under the severe conditions of northern winters, for each country appears to have troubles of its own.

When telephone lines were first built in Mexico, it was naturally assumed that the absence of severe weather conditions would warrant the use of lighter wires and small porcelain insulators, but these lines proved of great interest to parrots and ring-tailed monkeys, who made nightly visits to the lines in such great numbers for gymnastic practice as to break the wires, and it became necessary to use as strong construction as in northern climates.

In forest districts wooden poles are occasionally gnawed down by bears, who hear the humming of the wires and vainly seek to break in to some hive of bees.

The King of the Belgians has had telephone wires placed over his territory in Central Africa—one line crossing a jungle 750 miles in length. Here it is not feasible to use wood poles, as is customary in other countries, as they are perforated by white ants, and it is necessary to attach the lines either to trees or upon tubular iron poles. These poles appear to be a great curiosity to elephants, whose inquisitiveness emulates that of the blacksmith's apprentice who cut the bellows to find where the wind came from, and they pull up the poles with their trunks, probably in a search after the source of the humming noise, or perhaps to ascertain whether such strange-looking trees have succulent roots, and it is therefore necessary to secure the tops of these poles by guys running to higher trees wherever such conditions exist.

In Africa, as well as in India, the natives are prone to steal the wire, and it becomes necessary to remind them that "honesty is the best policy" by disconnecting the telephones from the lines during certain portions of the day, while the lines, instead of being used for telephonic purposes, are made part of a grounded circuit from a high-tension alternating-current dynamo, and this application of science prevents any native from touching the wire twice.

In all countries wasps make nests in the recesses on the underside of insulators, and the proverb relating to those who live in glass houses does not restrain them from showing umbrage in the most pointed manner whenever their tenancies are invaded by linemen.

At the southern portion of the United States, it was found that certain small insects deposited their eggs in the tubes containing fuses, and the formic acid secreted by the larvæ corroded the fuses and opened the circuits, and it became necessary to encase the fuses in the most secure manner.

Along the South Atlantic coast, fish-hawks make their nests on poles, and the linemen are obliged to carry sheath knives at their belts ready for defense against the fierce attacks of the parent birds.

Every possible precaution must be taken to avoid contact between high-tension and signaling lines, and prevent the occurrence of, rather than to rely upon protective devices to defend the plant against, physical injury, because the operation of a protector suspends the service over that line until the operative parts have been renewed.

At cross-overs it is preferable that the high-tension line should be above, as its wires are of larger diameter and generally fewer in number than the signaling wires.

The simplest method to prevent contacts in such positions is to make the upper span so short that the radial distance from the lower wire of the upper span to the nearest wire in the lower span is less than the width of the upper span; and then to dead end wires to prevent overhauling in case of breakage occurring on adjacent spans.

In many instances this method of line construction is unfeasible, because the poles for such a short upper span would interfere with the requirements of travel in a highway, and other methods of preventing contact in case of breakage must be adopted, usually by grills made of guard wires connected by slats transversely across them, or by nettings.

When different lines are parallel to each other, the distance between them should be so great that the higher line could not touch the wires of the lower lines if it fell toward it.

In all cases where high-tension and signaling wires approach each other, every precaution should be taken to provide against possible contact by use of heavy material in construction and guys and braces to the poles as may be needed to assure their stability, in order to prevent occurrences which would interfere with the continuity of the service.

UNDERGROUND WIRES.

The aerial lines pass from the poles into underground conduits in the congested parts of the cities, flying from the mishaps of storms and crosses to other difficulties which are largely those of greater expenditure and electrical problems.

The underground system is older than the aerial system of electric conductors in applied electricity, for a portion of Morse's invention of the telegraph consisted in methods of burying the wires, but the first seven miles from Baltimore laid underground in lead pipes placed in a plow furrow proved inoperative.

When a foreman on the work, because he could not bury the wires along the stone viaduct at Relay Station, placed them on poles, with cattle horns from a neighboring slaughter-house as insulators, the expedient proved so successful that the remainder of the line to Washington was built in this manner, and the first portion reconstructed.

The underground conduits consist of groups of continuous ducts, generally three inches in diameter, and made either of vitrified tile, cement monoliths reinforced with iron, or creosoted timber, but circumstances often lead to peculiar modifications, as at St. Paul, Minn., where the streets are catacombed with tunnels which are readily made through the soft white sandstone which underlies that city, and the telephone cables are attached to the sides of these tunnels. Some of these tunnels emerge through the face of the bluff, where grated doors furnish light and ventilation.

Every few hundred feet these conduits lead to an underground chamber for the purpose of obtaining access to the cable to provide for branches to the service of patrons, and also joining the ends of sections of the cables together.

These underground cables consist of from two to six hundred twisted pairs of wires insulated with paper and the whole covered with a lead sheath.

The electrical difficulties of telephoning through underground conductors were at first prohibitive in their nature, but improvements enabled this to be done later, and in the face of conditions which rendered one mile of underground the equivalent of fifty-two miles of overhead wire; but in the modern cable one mile of underground is the equivalent of twenty-eight miles of overhead copper wire one-sixth of an inch diameter, or twelve and a half miles of overhead copper wire one-tenth of an inch diameter.

These conditions are so severe that on long lines it is necessary to pass around intermediate cities to avoid under-

ground wires, and in the suburbs of large cities are switching stations by which connections may be provided to enable patrons to send their messages by branch lines direct into the cities, or permitted to continue on the main line to places beyond.

Conditions of safety and good service require that a telephone underground system should not also include lines of electric lighting and power circuits, and serious mishaps have occurred in the few instances where the attempt has been made to place these diverse types of electric circuits adjacent to each other in the same underground system.

The rapid corrosion of the lead sheaths of underground cables, even in localities where lead pipes had lain uninjured for many years, was an unexpected occurrence of the most serious nature; and it remained for the late I. H. Farnham, of the New England Telephone and Telegraph Company, to discover, in August, 1891, that this impairment was caused by the return currents of the grounded circuits of the trolley railroad systems, whose passage through the earth, from the cars where they left motors to the ground plates under the generators at the central power stations, produced chemical effects similar in principle to those of electro-plating, by which metal was removed from the underground telephone cables, gas and water-mains, and deposited beneath the rails.

At the instance of Mr. F. S. Pearson, chief engineer of the West End Street Railway, in November, 1892, the currents used in trolley railroad practice were reversed in polarity from the customary method prevailing at the time, so that the trolley wire would be positive to the earth, and the return currents would tend to build up material on all continuous metallic underground construction until near to the central electric power station, where the electricity leaves such conductors for the ground plates under the generators operating the trolley system, and would therefore produce more active impairment by the removal of metal at this point, were it not for large copper rods connecting these underground pipes and cables to the ground plates.

This course reduced the difficulty in the measure that it was capable of being carried out in practice, for electricity follows divided lines in proportion to their relative conductivity, and a certain amount will follow along the underground conductors until it reaches a direct path of electrical conductivity leading to the ground plates.

This treatment of the problem appears to have been more satisfactory with continuous underground conductors, such as electric cables, than it is with underground pipes having joints of different electro-chemical equivalencies.

The divergence of the return currents from the rails has been reduced by bonding the rails together with copper rods, or by casting iron around the ends of the rails, and also the use of heavier rails.

OFFICE DISTRIBUTION OF WIRES.

The terminals of the underground cable at the telephone central station emerge from their lead sheaths and are spread out upon a large iron rack known as a distributing frame, where the insulated wires are equipped with protectors for the same purpose as those at the subscriber's instrument, and the wires are changed from the order in which they are received from the cable to another classification, and thence to a similar rack called the intermediate frame, where the wires are grouped to the individual operators, which latter arrangement may be changed from time to time, as the number of telephones to which an operator can give attention varies according to the character of the service; that is, a business house conducting much of its affairs by telephone, uses many messages a day and requires more of an operator's time than a residence, with its infrequent use of the telephone.

THE SWITCHBOARD.

The function of the switchboard is merely to place the ends of the wires from one telephone in electrical contact with those of any other telephone in the exchange, with suitable signals for calling the operator and the party addressed, and this system has been amplified until one human voice can reach to districts including considerably more than half the population of the United States; and the interlacing has been so complete that its service reaches the smaller villages.

The first switchboards were based upon the telegraphic device of placing any two of half a dozen lines in contact, and the further development merged the principle of the annunciator used in hotels or in passenger elevators, in which a falling target or shutter, called, in like manner, the attention of the operator. With the needs of the patrons, the switchboard grew, new features were added, and old methods became discarded; every conquest of improvement meant an abandonment of former devices.

In these new switchboards the dropping shutter has been supplanted by the flash of a lamp to signal the operator; the turning of a crank to generate a current for moving a shutter is no longer necessary, and the subscriber removes the telephone from the hook and is ready to begin; galvanic batteries are not installed at the subscriber's equipment, but the whole of the electric energy is supplied by storage batteries at the telephone central station.

When the subscriber removes the telephone from the hook, which is merely an electric switch arranged to be operated in this manner without conscious effort on the part of the subscriber, a small electric bulb about the size of the end of a lead-pencil and embedded in the switchboard becomes illumined with an opalescent glow which attracts the attention of the operator, who inserts a plug at the end of flexible conductors into a small socket perforating the face of the switchboard just above the electric light, and this corresponds to the telephone of the subscriber, and the socket guides the plug to contact with the ends of the wires from the subscriber's telephone, and the insertion of the plug in the socket also extinguishes the signal light.

A touch upon an electrical key places the operator's telephone in circuit with the telephone of the subscriber who hears the inquiry for the number wanted.

On receiving directions, the operator inserts the plug at the other end of the same flexible conductor into the socket corresponding with the telephone wires of the party desired, and this lights one of a pair of signal lamps embedded in the table projecting from the front of the switchboard.

If, however, the operator hears a click, on inserting the second plug, this serves as a signal that the desired line is in use elsewhere on the board and the line is reported as being "busy."

It is more personal trouble for an operator to report a line as being busy than it is for her to complete the connection.

When the party called to the telephone removes the instrument from the hook to receive the message, this light on the table becomes extinguished.

After both persons have finished talking, the hanging of their telephones on the hooks flashes the pair of lamps on the table, which glow until the operator, perceiving the signal, pulls both of the plugs from their sockets.

If, instead of a subscriber at the same switchboard, one is desired at another exchange, the proceeding becomes more complicated, and many of the arrangements of the modern telephone central stations and methods of administration are designed to provide for this extension of the service.

When a call for a telephone connected to some other switchboard is received, as the operator cannot reach a line directly to the desired telephone, the call is transmitted by an office line to a special operator at another switchboard, where it is noted on a memorandum blank, and the time automatically recorded by means of a clock registering stamp; then the call is transmitted by trunk lines to the

desired telephone central station, or it may be to some station which can reach the desired subscriber, and in some instances it is necessary to transmit the message through a greater number of telephone offices, each one building up the line by additions, and every operator also keeping, by means of the time stamp on memorandum blanks, a record of the hour and minute of each step from the initial call to the final termination of the conversation and the release of the lines.

As soon as an operator has finished the entries on a memorandum blank it is placed in a small orifice, where it is carried by air pressure, through tubes in a manner similar to the well-known cash carriers, to another department, where it is compared with similar memoranda made on the same conversation at other points on the line by clerks, and these form the authority for the charge for the toll service.

These memorandum blanks are compared by clerks, and must balance as in other bookkeeping, and form the authority for the charge for the service.

In some instances, where there is a great load of service on long-distance lines, the communication from one central station to another by the operators for the purpose of obtaining the desired party at the telephone is carried on by telegraphing over the telephone lines; for there are methods by which this can be done without interfering with the transmission of conversation at the same time on the identical wires, and these lines branch near to their terminals, where each class of electrical currents is transmitted to its proper instrument, whether of the telegraph or the telephone system.

A telephone switchboard is an exception to general forms of construction in that the cost per unit increases at a greater rate than the enlargement, and this is due to the fact that, as the operator who receives a call from a subscriber must be able to reach the terminals leading from the switchboard to any other telephone or to the switchboards at other stations, each set of telephone wires must have as many sockets and branches as there are operators' sections at the switchboard.

For example, in a small switchboard with two operators' sections, there would be two sets of such branches and sockets for each telephone line, while in a large switchboard with fifty operators' sections, there would be fifty sets of such connections for each telephone line instead of the two sets mentioned in the first instance, the number of this class of connections multiplying twenty-five times for each telephone, in order to enable each operator to reach all subscribers connected to that switchboard.

This difference in cost may be appreciated by reference to the material entering into the composition of a switchboard for 10,000 telephones and one for 600 telephones, the individual items in each being alike and of the same cost.

In the larger switchboard there are 2,500,000 soldered connections, or 250 to each telephone; and in the smaller switchboard there are 43,000 soldered connections, or about seventy-two to each telephone.

In the larger switchboard there are 10,000 miles of wire, or one mile to each telephone; while in the smaller switchboard there are 220 miles of wire, or about one-third of a mile to each telephone.

Many other details follow similar proportions, and in some minor items the ratio of cost per telephone is in favor of the larger switchboard, but the whole expense per telephone is vastly greater for the larger switchboard.

There are other percedents in construction, where an increase in size adds disproportionately to the cost, as bridges, where the expense of a larger span is disproportionately greater than a smaller one of equal strength; and in like manner large pipe-organs cost more per unit of capacity than smaller pipe-organs.

Another instance of increased cost per unit of measure which is familiar to all is that of fabrics, whether it be an Oriental rug, wherein the cost of a large one is greater per square foot than a small one, down to ordinary sheeting, where cloth of full width for such purposes costs more than cloth of the same weight whose width requires one or more seams.

This increase of complication of detail growing upon itself would reach a prohibitive cost in large cities had it not been found feasible to depart from the original plan of one central telephone station in each city, and to introduce a modification by apportioning large cities into telephone districts, each with its telephone station connected to the others by numerous trunk wires.

A telephone switchboard is a marvel of complexity of detail in extreme contrast to the simplicity of operation, and no one person can have the repute of its design, but it is one of the few inventions which were made by the concerted effort of many experts working together for a purpose.

The mechanical intricacy of the modern switchboard may be well appreciated by the fact that, even with present methods of special machinery, and the organized application of skilled artisanship, it requires as long to make and install a large switchboard as it does to build and equip a merchantman, the time being from one to over two years, and the cost of the central station plant may reach $1,200 per foot of length for the larger switchboards, and perhaps half that cost per foot for a switchboard adequate for a city of fifty thousand inhabitants.

These central station costs are a small detail of the whole cost of the system, although it is the greatest concentration of value and forms the vital part of the whole exchange.

There is an exaggerated opinion of the damageability of a switchboard by water, and while it is perfectly true that it must be thoroughly dry for practical operation, yet switchboards have been thoroughly wet and restored to good service by drying out. It is the general custom to provide water-proof covers for switchboards as well as for generators and motors whenever it is considered that there is any hazard of a water damage from fires in other parts of the building which might cause an interruption in the service.

One of the floating statements, which probably originated among the wheels in the head of some man set to the task of filling a funny column, runs to the effect that a glass of water would cause $1,000 damage in a switchboard, and the statement is absolutely a false one.

When a switchboard is started in the service, the elements of its active demolition begin; repairs and adjustments are necessary, extensions become needed for increased capacity, wear and tear has been outclassed by the more iconoclastic depreciation from subsequent invention, and in a few years the old board becomes obsolete, and the expensive apparatus is burned for the intrinsic value of the copper which it contains.

The requirements of perfect adjustment and continuous operation in a telephone system necessitate expenditures involving amounts beyond the dreams of avarice.

The charge for maintenance is far greater than that of the operation of the telephone system, being the greatest single expense. One-third of the gross revenue of a telephone company is necessary to preserve the plant in good order without any reference to the cost of extensions or of operation.

THE VARIABLE USE OF TELEPHONES.

The grouping of the use of the telephone may well serve as the basis of a sociological study of the habits and customs of a community. For studying the conditions of service for which provision must be made, the number of communications each hour of the whole day is taken from time to time, and the result plotted in a diagram whose hills and valleys indicate the relative load of service on the system.

Whatever disturbs travel also affects telephony, as may

be noted by the increase in the number of calls, even to full capacity, during storms or in extremely hot weather.

In all cases, the night use between 7 p. m. and 7 a. m. is a small proportion of day use, and while these calls are largely of the important nature of emergency calls for fire department, physician, or police, yet in number they are slightly over one per cent of the calls of the whole twenty-four hours; but the calls during the day begin to increase suddenly at some hour in the forenoon after the morning mail has received attention, and approaches the congestion limit in the middle of the day, falling off suddenly as offices are being closed, and resuming activity in the larger cities late in the afternoon when arrangements for dinner or theater are being made.

In the West the general business day is longer than at the East, while in New York the plotted diagram of telephone connections each hour indicates by the short duration of the intensely busy period that many might avail themselves of Charles Lamb's excuse to the Bureau officer in the East India Company's office, and make amends for being late at their desks in the morning by leaving earlier in the afternoon.

In New York the short time taken for lunch, or indeed its omission, does not make a sufficient break in business affairs to produce a depression in the curve, while in another city the depression is so great as to suggest a noonday dinner at home, perhaps followed by a nap of forty winks.

THE EXTENT OF ITS INTRODUCTION.

The total amount of telephone line of the Bell system throughout the United States averages three and twenty-nine hundredths miles for each telephone instrument, and, excluding the long-distance lines, fifty-five per cent of the wire is underground.

When a person calls up another telephone, the average line plant at his disposal is six and fifty-eight hundredths miles; truly, "it is cheaper to talk than to travel."

The long-distance wires interlace the whole system into a unity from the Atlantic to the Pacific, although a portion of the lines in the far West are not suited for long-distance transmission; yet conversation from ocean to ocean is one of the expectancies of the near future.

This growth of the lines of the system is the result of a purpose to extend the use of the telephone to every town, no matter how small, throughout the United States.

The extent to which this policy has been put into actual construction is indicated by the fact that, while the last census gives a record of 10,602 incorporated cities, towns, villages and boroughs in the United States, there is telephone communication to 26,128 different settlements, and the continued growth of extensions postpones, year by year, the saturation point of telephone service which has been recurrently anticipated by conservative persons.

THE OPERATION.

The telephone business in its complications, on one hand, and its close relations with the needs of its patrons on the other, is one requiring active zeal.

As a certain French prisoner in the Bastille could always see an eye at a hole in an upper corner of his cell following his every movement, so with as vigilant though more agreeable espionage, there is always an ear waiting at the office end of a telephone line to take the directions of the subscribers in giving service.

Under American conditions, the equipment of the plant and its attendance must be adequate to give practically instantaneous service at all times, even though the demands at night are but slight in comparison to the requirements of the day.

The methods of Oriental potentates who send their seneschals to agitate the pools in the palace yard in order to keep the frogs from croaking during the Shah's siesta, are repeated in two European monarchies whenever the emperor uses the telephone, as all the operators are obliged to leave their positions at the switchboard, and withdraw in military evolution from the room while His Majesty holds converse.

The striking feature of the two great applications of electricity which are used by the public, namely, the street-car and the telephone system, is that, however complex their mechanism, their use is extremely simple.

There is, however, no premium on ignorance in the use of the telephone by either subscriber or operator.

It has been a matter of slow growth for the subscribers at large to use the telephone in the best and simplest manner, and that is to speak clearly rather than loud, and to avoid the use of merely formal words in calling for the number wanted.

Nothing reveals more prominently the innate courtesy of a person than the manner of address over the telephone, whether to operator or subscriber.

Operators are prepared by a short course in a special training school which differs from other institutions of learning, except West Point and Annapolis, in that they are under pay during the period of tuition.

The result of such systematic work in connection with improved apparatus in New York, which is cited as an example, because the exact statistics are at hand, has reduced the time of making complete local connections during the last five years three and nine-tenths seconds, which may appear a short time to anyone, except when waiting at telephone—or looking into a gun—but this small amount of time when applied to all the telephone connections of the Bell system in the United States, amounts to 15,070 hours a day saved to the subscriber's time, or about five and five-sixths years in eight-hour days. The saving of time in disconnections, largely owing to the common battery switchboard signaling the operator by lights rather than shutters, enables the lines to be released, when a conversation is at an end, three and two-third times as rapidly as formerly, and this is of great advantage to the subscriber in making repeated calls.

These improvements in calling save 1,883 years of subscribers' time every year, and over three times as much time in disconnecting, a part of which time is available for the benefit of the subscriber, but no one has ever ventured to estimate the gross amount of time saved by the use of the telephone.

This vast system provides for about 14,000,000 calls per day, or nearly 2,000 calls a year originating at each telephone, and this means that an equal number of calls are received on the average telephone, so that each telephone averages being in use 4,000 times a year.

Why wonder, then, that these conversations, concentrated for the most part in the middle of the day, will sometimes interrupt another, and "the line is busy—please call again"?

This interruption has been largely diminished of late years, first by the installation of two telephone sets by a subscriber, one being omitted from the telephone book, so that it is not subject to interruption by calls, and this instrument is therefore always free for use by the subscriber.

The second step in the development of the use of the telephone is an example of the modern principle of the conduct of business affairs in the subdivision of matters, so that each element may be attended to by one excelling in that branch; and in telephony this is done by concentrating the lines from the several telephones in an establishment to one desk, where, under the service of a skilful attendant, the desired connections are obtained.

Private branch exchanges are not limited to commercial houses and manufacturing establishments, but high office buildings are equipped with telephones as well as elevators during construction.

This concentration reduces the number of lines from the telephone central station to this group of telephones, and,

while the commercial advantages of the method are so apparent that the number of these private attendants in New York is more than twice the number of telephone central station operators, yet it must be obvious as an underwriting principle that there is an advantage from an insurance standpoint in this arrangement, for as everything has some relation to the fire hazard, that of the telephone is based on the exposure of the wires leading to the subscribers' instruments to foreign currents, and if the number of these wires can be reduced from a pair leading to each telephone, down to two or three circuits leading to a normally open switching arrangement, which in turn can connect to any of these telephones, then the chance of occurrences resulting from foreign currents is in like manner minimized without reference to the defense afforded by the protectors.

Furthermore, the entering wires are equipped by protectors as may be required, near to the entering point; and the whole group being under the care of an experienced attendant, better service can be obtained, as in case of any interruption to one circuit, some other circuit can be used to call for necessary repairs.

This interruption to service has been reduced to a very slight matter, and this is generally owing to an enlargement of the plant, where the changes are made at night. In New York the interruption to each substation from all causes is one hour and twenty-one minutes a year, generally without the subscriber's knowledge, as is shown by the fact that the complaints are only one to 15,138 lines per day, or once in forty-one years per telephone.

The subscriber to a telephone loses personal identity, and his name merges into a number.

When telephone central stations were first established, the names and positions on the switchboard of the subscribers were known to operators with strong memories; an epidemic of measles occurred in Lowell, Mass., and Dr. Moses Greeley Parker, a member of the board of directors, viewed with alarm, from his standpoint as a physician, the possible condition of affairs if more than two of the four operators should be taken with the measles, and proposed that the subscribers should be numbered.

His associates demurred, as they were of the opinion that the subscribers would give up their telephones sooner than submit to the indignity of being known by number, but in view of the contingency of the service being paralyzed they finally yielded, and to the surprise of all, the new arrangement was cheerfully accepted by the subscribers, who appreciated the improvement in service which resulted from the change.

Essential as the telephone is now to the conduct of affairs, no one can state, except as a general principle, why a person subscribes for a telephone.

While a large town uses more than a small one, the ratio of telephones to population differs materially in various places to an extent beyond what may be attributed to the personal energy of those in charge of local affairs; and in like manner the relation of the number of telephones to the number of horses, electric lights, business houses, assessed valuations, or any other of the details of census enumeration fail to give any basis of close comparison.

However, there are several lines of general similarity which cannot be tabulated in the logic of numbers.

Where highways are bad, there is a large amount of toll line telephone traffic. A hilly town uses far more telephones than a similar one on flat territory, and in some particulars one in a warm climate appears to give more patronage than a similar town in a cool climate; all of which shows that there is force in the injunction, "Don't travel; talk."

In the use of the telephone there is originally one element of surprise to be mastered.

The senses are co-operative in their relations with each other, taste is rendered more vivid by smell, sound and sight accompany each other; with the use of the telephone there has been need of practice to accustom one to the sound of a voice through the telephone without the help of other senses to determine its position, which may be near or far.

The Arab proverb, "Speak, that I may see thee," does not apply to the telephone.

The impersonal question and its rebounding answer are developing methods of concentrated mental effort which are adding to the potentiality of the individual.

The Orientals are great users of the telephone, as the telegraph is not adapted to the transmission of their written languages, on account of the great number of their characters, and messages are necessarily translated into some modern language, and after receipt interpreted back into their languages, with the inevitable tendency to error. The Japanese are especially large users of the telephone.

The telephone can be used by Chinamen who understand each other's dialect, of which there are about seventy-five varieties in China.

There is a Chinese switchboard in San Francisco, at which the operators must know the four principal dialects of the provinces which furnish the immigrants to this country.

As an example, the sign for telephone office can be read by any Chinaman, but the pronunciation would be different, as noted by examples from two of the leading dialects, and its universality in this respect is comparable to Arabic numerals, which can be understood by all civilized nations, although read in far different words.

The telegraph has made correspondence more concise and checked the tendency to "degenerate into fine writing"; the typewriter is bringing the spoken and written English together, for the Chinese have not the monopoly of dual languages, and the telephone is making direct and definite propositions and replies in the three minutes between "hello" and "good-by."

Like Queen Victoria's published diary, it has given sanction to colloquialisms, and even slang, and imparted to words new significance not stated by the dictionary.

It appears that these changes originate with the subscribers rather than the telephone companies; for instance, a telephone central station is generally referred to as an exchange, while a telephone exchange, according to its use in patents, contracts, and by courts, is the telephone plant within a circle thirty miles in diameter, for the original concessions of the telephone company were like the Spanish land grants in the western hemisphere, except that the circles do not overlap, nor are their centers moved at the will of the stronger holders.

LONG-DISTANCE TELEPHONY.

The toll line service began with the line built from Boston to Lowell in 1879, and this revealed both the functional possibilities of the telephone and the great many technical difficulties which have been overcome, and in the space of twenty-six years the length of long-distance telephone lines has increased from 27 to 368,000 miles. But these lines are not to be considered as comprising all of the lines outside of any municipality, as they can be attached to lines about 6,000,000 miles in length and, radiating at these points, reach to the desired subscriber.

The long-distance commercial service may be considered to date from the New York and Chicago line, which was opened on October 18, 1892, by Alexander Graham Bell, in the presence of a concourse of persons eminent in electrical affairs; and on February 7, 1893, Gov. William E. Russell and a body of prominent Boston men opened the line from Boston to Chicago.

When a person uses a long-distance telephone, a large amount of property is at his exclusive service—for instance, in speaking from Boston to Omaha, as one business firm does every morning, the value of the fraction of line and apparatus at their sole disposal is, at the present price of copper, $283,000, while it requires the service of over nine

operators at the switchboards at various points along the line.

The weight of this copper is one million, one hundred and thirty-one thousand pounds, or five hundred and sixty-five and one-half tons, and the wonder is not so much in the fact that a human voice can cause vibrations in its unison throughout this immense mass of metal, even to its uttermost limits of 1,600 miles, with those delicate touches of tone which determine the individuality of one voice from another, as it is that the telephone is so delicate that it can catch these vibrations and transmute them into speech. Truly did Archimedes exclaim, "When I stamp, the world trembles!"

THE REAL ESTATE.

The permanent nature of the underground conduits of cities requires that telephone offices should be as permanently placed in relation to these conduits, and it has been necessary for the telephone company to buy land and erect fireproof buildings where the wires are placed underground, as it would not be prudent to be subject to the mutations resulting from leased buildings.

The telephone company is now among the largest real estate owners in the country, and it probably has the largest number of buildings of any single commercial organization, and a still larger number of holdings of real estate, and also the ownership of the largest number of fireproof buildings.

In order to make every feasible provision for the permanency of the telephone service, the buildings erected by the telephone companies are, with the exception of a few having mill floors, entirely of fireproof construction, and the designs are especially made with a view to obtaining stability under heavy loads, and to afford resistance to fire.

They are equipped with subsidiary fire apparatus, and the windows opening toward exposures are provided with fire shutters.

In smaller towns, where special telephone buildings are not warranted, and it is necessary to lease space for central stations, the utmost care is exercised to select the best buildings available for the purpose, and these are generally that type of building well known in small towns, where the first story is occupied by a national bank on one side of the front entrance, and a savings bank or the postoffice on the other side.

There is a general inspection of central station property, which includes reports on general order as well as matters pertaining to the service and the conditions of the electrical apparatus.

In addition to night watchman's patrol on such properties, notwithstanding the constant occupation of the operating room, there is a constant supervision of the central station apparatus against all disarrangements, which is equal in the larger central stations to an inspection of the plant every twenty minutes.

Wires are placed underground in cities, some of the apparatus is in duplicate, and reserved portions are stored at convenient points, and the operation of the whole plant is under a constant supervision. The electrical apparatus is frequently tested, inspectors patrol along the route of aerial lines, trials of service are made at subscribers' instruments, and the apparatus examined in addition to electrical tests made from the central station without the subscriber's knowledge; even the electrical condition of the earth as modified by return currents of the electric railroads is frequently measured.

All of these initial conditions and precautions of operation for the purpose of maintaining the permanency of the service have also reduced the fire losses on these properties to a nominal amount, that of the New York Telephone Company since its incorporation being less than five and one-fourth per cent of the premiums.

In other manner than refraining from having cause to make claims, the telephone company has proved a most efficient ally of the underwriters' interests, for each instrument is a fire alarm, and in many towns the only fire alarm, and is always ready to transmit emergency calls to the fire department, the police, or other help in addition to the ordinary commercial and personal uses of the instrument.

MISCELLANEOUS APPLICATIONS.

The telephone habit is causing subscribers to use their telephones a greater number of times each day, and circumstances are finding new uses, which in turn become grafted into the system.

A few years ago, when an ocean liner was stranded for a few days on the New Jersey coast, a man rowed out to the vessel, with a telephone set attached to a twisted pair of waterproof insulated wires, which served as a submarine cable, which connected to a telephone line on shore, and officers and passengers used the line until the boat was pulled into deep water, and finished her voyage.

It is the custom to anchor vessels in the lee of the coral reef which forms one side of the harbor of Honolulu in the Sandwich Islands. When a vessel comes to her moorings, the local telephone company attaches a branch cable at one of the many taps of a telephone cable which runs along this reef, and passes it over the stern of the vessel, and also a telephone which is installed in the cabin, and in this manner provides facilities for transacting much of the ship's business by telephone, even to reporting to the custom-house authorities.

From this was but a step to the present custom of connecting steamers by telephone while they are lying at dock, and this may have been anticipated by the practice of connecting fire-boats by telephone when they are moored.

Express trains at the West are frequently connected by telephone at stations where there is a stop for a few minutes; and the trolley cars of long lines in Ohio have telephone booths.

The special train which carried the Commercial Club of a western city on an extended trip was equipped with telephones at each seat which furnished the passengers, through a private branch exchange, communication with each other and with a mixologist of rare skill who held sway at the life-saving station in the buffet car, and at stations attachments were made to the telephone lines of the general system.

The cars of the funicular railroad on Mt. Tom, near Holyoke, Mass., are equipped with telephones, connected by sliding contacts to a pair of wires at the side of the track, so that the motormen on the two cars can communicate with each other.

Railroads, particularly trolley lines, are largely managed by telephone, and the installations at large terminal stations are on an extensive scale.

Wrecking trains are equipped with telephones which can be connected with a telephone line along the right of way, and communication established with headquarters of the company.

Business meetings and conferences are held by means of telephones, which are joined together in such a manner that the whole number, instead of merely any two, can hear what any one says.

The board of directors of a Chicago corporation has members also at Milwaukee, St. Paul, and Detroit, and meetings are frequently held with these men at their telephones taking part in the proceedings.

At presidential conventions a person near the stage telephones in a low tone an account of the proceedings, which is repeated by another in a neighboring telephone station, where the wires are connected to a number of telephones, and these messages are repeated in like manner at each change until its amplitude extends over the country wherever there are telephone lines, and at various points the information is taken down by stenographers.

Political slates are shattered in the most iconoclastic man-

ner by means of canvassing done over the telephone.

In hotels the telephone is used to call from rooms to the office, obtaining quicker and more accurate service than can be secured by waiting for a bell-boy, by whom the message may be forgotten or distorted, and these room telephones can also be used throughout the general telephone system.

Oaths are administered over the telephone; it is against the rules of the company to utter them. Threats are made from the safe vantage of a sound-proof booth, and lawyers have been at variance as to alleged libels in the same manner. That lovers woo and swains propose over the telephone is an everyday remark, but a young man in Muncie, Indiana, had some difference with a miss, and was shown the door, with the injunction never to call again. Asking permission over the telephone a few days later to call again, her reply was to fire three revolver shots into the transmitter, so that the young man had good cause to remember that absence of body was preferable to presence of mind.

In the manufacture of steel the melted iron runs from the tuyeres of the blast furnace into crucibles on cars, which take it to the steel converters a half mile or more distant. When the metal is flowing into the crucible, a boy takes a ladleful, which cools quickly, and is analyzed at once by the chemist, and the result telephoned to the steel superintendent, who is thus informed before the arrival of the molten iron as to the amount of spiegeleisen to add to obtain steel of the desired characteristics.

Telephone lines penetrate mines, extend through air locks of tunnels and caisson foundations; they ramify about extensive manufacturing establishments and form part of the equipment of vessels; they accompany the advance of armies, and the commander is kept in communication with the firing line.

It is of great value in giving the results of target practice, especially with artillery.

None of the applications of the telephone furnishes greater alleviation to humanity than its use in hospitals, particularly those devoted to contagious diseases. There have been several instances of pupils living at houses under quarantine, who continued their studies at home, recited their lessons, and successfully passed examinations over the telephone.

In short, its applications are becoming more extended as the emergency of yesterday becomes the precedent of to-day.

VALUE OF RURAL TELEPHONES.

Conclusive evidence that the farmers of the country are using the telephone and depending on its service more every day is found in the statement that three-fourths of the telephones sold by Independent manufacturers are for rural lines. The farmer no longer considers the telephone a "new-fangled contraption," an amusing fad or a toy for the womenfolk to use in visiting. It is as much a part of his farm equipment as his reaper. In fact, he uses the telephone much oftener than any of his agricultural implements, for never a day passes that the wire does not serve him in bringing him market quotations or orders for produce or live stock, or in carrying his messages to town and saving him both time and money. The telephone filled a want in rural communities that nothing else—not even the rural free mail delivery—could satisfy, and every day sees its use more widely extended. It has brought the farm into touch with the town, not only enabling the farmer to be in constant communication with the commercial world but lightening the burden of loneliness that has pressed heavily on their wives and daughters. The history of all rural lines shows that the women are as enthusiastic advocates of the telephone as the men, and do as much to make the country exchanges successful.

Naturally, the distance between farm houses makes the telephone a genuine blessing in the country. The wires strung over hill and dale make neighbors of farmers scattered over sparsely-settled townships and form a tie that is a genuine comfort at all times and an invaluable aid in cases of emergency. When accident or illness overtakes the family on the farm it is no longer necessary to hitch up the team and drive several miles for the physician, thus losing precious time both in securing medical help and, perhaps, in the work in the fields. Instead, the telephone is resorted to and the physician is summoned by wire. Should he be absent from his home, the telephone message pursues him to another bedside, and he is able to respond without serious loss of time.

As for the business uses of the telephone on the farm, they are manifold, and the tillers of the soil now wonder how they ever managed to get along without its service. It has enabled them to take advantage of fluctuations in the grain and live stock markets, and added many a dollar to the yearly profit. The price of farm lands has increased wherever rural lines have been extended, and to-day one of the surest methods of gauging the prosperity of an agricultural community is to ascertain the number of telephones therein used. The dissemination of knowledge has been the natural sequence of the extension of rural lines, and it is generally conceded that the more telephones there are in a country township the fewer will be the investments in gold bricks. Somehow the two industries do not thrive together, which, of course, is a matter for congratulation.

WIRELESS TELEPHONY.

According to cable messages from Germany, a practical test of wireless telephony on the Bonserath system was made recently at Cologne. The receiving apparatus, which was of a highly sensitive nature, was placed close to the bank of the Rhine and messages were transmitted across the stream, it is said, with success. The transmitting and speaking apparatus, with a battery of twenty cells, was connected with a copper wire, the end—attached to a zinc plate—being sunk to the bed of the river. The Rhine served as the conductor and the receiving device reproduced the sounds, enabling persons to converse with others on the opposite bank of the stream. Experiments were made over a distance of five kilometers, and while sounds were received from a greater distance it was impossible to distinguish the words. It is believed by German engineers that wireless telephony may be of use for shipping and harbor traffic.

LONDON HOTELS NOT PROGRESSIVE.

The National Telephone Journal of London sharply criticises English hotel proprietors for not installing hotel telephone systems in their establishments, and placing a telephone in every guest room. The old-fashioned methods of the British tavern-keepers are compared with the progressive policy of American hotel men, much to the advantage of the latter, and calls attention to the fact that the United States is far ahead of England in the utilization of the telephone. The prediction is made that in time the Britishers will be forced to adopt the methods of their American cousins and equip their hotels and large business houses with complete modern private branch exchanges.

LIST TELEPHONE STOCKS.

The board of governors of the Columbus, Ohio, stock exchange recently listed the securities of the Cuyahoga Telephone Company and the United States Long Distance Telephone Company.

The common and preferred stocks of both companies are now on a dividend basis, and several blocks of them have been purchased by Columbus men.

DIGEST OF TELEPHONE PATENTS

By Edward E. Clement

822,965. Calling Device for Telephone Exchanges; Lundquist. This is a subscriber's impulse transmitter having contact closing devices with means for operating them and a register associated with the contact devices so that it will automatically register the number of contacts in each series of contacts made by the closing devices. Patent unassigned.

822,966. Calling Device for Telephone Exchanges; Lundquist. This is also a subscriber's impulse transmitter, and, unlike the former, is provided with an indicating device which is automatically held for a brief period in its set position and has automatic means for returning it to normal position and thereby operating a contact device. Patent unassigned.

822,968. Relay; Manson. In this relay the armature is pivoted upon the frame and the intermediate spring of the set is provided with a projecting pin for engagement with the armature. All the springs extend forward to a point substantially flush with the armature so that they are visible and accessible from the front of the relay. Patent assigned to the Dean Electric Company.

822,976. Automatic Telephone System; Manson. This is an automatic system in which there is shown means for preventing the operation of the switchboard or circuit controlling devices while any two subscribers are connected. Patent unassigned.

823,061. Telephone Receiver; Manson. In this invention the receiver has the permanent magnet structure moulded in a soft metal section which is secured to the receiver casing by screw threads and cement. Patent assigned to Sumter Telephone Manufacturing Company.

823,090. Telephone Transmitter Attachment; Walton. In this invention there is a supplemental diaphragm carried by the mouthpiece which is provided with a valve so that the vibration of the voice can be cut off from the speaking diaphragm in cases where it is desired to converse with parties in the office to the exclusion of the party being communicated with. Patent unassigned.

823,091. Telephone Switching Apparatus; Walton. In this invention there is shown a switch inside the transmitter casing and having a handle projecting therethrough so as to cut out the transmitter for the purpose assigned to 823,090. Patent unassigned.

823,092. Telephone Transmitter Attachment; Walton. This is a dampening device carried by the mouthpiece so as to prevent the diaphragm from speaking when needed. Patent unassigned.

823,215. Telephone System; Green & Green. This is a switching mechanism employing a rotary cam device and means for locking it in predetermined positions and also employing polarized magnets for controlling the releasing mechanism. Patent unassigned.

823,299. Telephone Call List and Memorandum Slip Attachment; Smith. This invention employs a frame work adapted to be attached to the standard of desk sets and contains a spring controlled slip on which important subscribers' numbers are enumerated and a similar roll for making memoranda. Patent unassigned.

823,336. Transmitter Arm; Knight. This is a hollow transmitter arm having a novel pivotal connection to the casing of the wall set which allows for the free passage of the line-wires. Patent assigned to The Williams-Abbott Electric Company.

823,494. Guard for Mouthpieces of Telephone Transmitters; Grimm. This is an antiseptically treated guard for the mouthpiece of transmitters which is adapted to be slid over the mouthpiece so as to removably engage it. Patent unassigned.

823,559. Director Attachment; Stone. This invention comprises a bent rod and a clamping device for securing the rod to the desk-set and a directory secured upon the rod so as to be easily visible to the user of the telephone. Patent unassigned.

823,579. Transmitter Support; Beyland. In this invention the transmitter casing is so formed as to constitute one-half of a ball and socket joint, the other half of which is formed in a drawn metal box constituting the enclosing casing of the wall set. Patent assigned to The Dean Electric Company.

823,758. Supporting Arm for Telephone Transmitters; Beyland. This is a hollow transmitter arm pivotally secured to a base having a terminal rack, said arm having a projection adapted to limit its movement. Patent assigned to The Dean Electric Company.

823,763. Telephone Relay; Clement. This is a telephone relay which has means to reduce what is known as the "Time contsant," or to produce electrical undulations in the secondary circuit corresponding to the original sound waves without appreciable distortion. Patent unassigned.

823,768. Telephone Transmitter; Dean. In this transmitter the carbon button rests directly against the main diaphragm and is provided with an adjusting device carried by the bridge. Springs bear against the back of the button and hold it against the main diaphragm. Patent assigned to The Dean Electric Company.

823,886. Telephone; Merryman & Allen. This is a lighting attachment for use in connection with subscribers' senders so as to furnish an effective light over a prescribed area to enable the operator to use his sender or consult the directory. Patent unassigned.

823,973. Induction Coil; Sauvé. This induction coil employs a tertiary winding for increasing the efficiency of the coil. Assignor of forty-nine one-hundredths to Jacob H. Robbins.

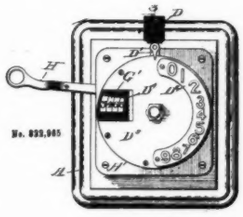
824,030. Telephony; Kitsee. This is a ground return system, having a condenser, resistance and impedance coil in the ground circuit. The transmitter and battery are in a local circuit and the receiver is bridged between the metallic line and the ground. Patent unassigned.

824,032. Telephony; Kitsee. This is a long-distance system, having two separate metallic circuits connected together by the interposition of an inductive circuit. Patent unassigned.

824,159. Microphone; Treyer. This is a microphone transmitter, having separate carbon receptacles on either side of the diaphragm for harmonizing the variations on both sides. Patent assigned to Casper Ryf of Zurich, Switzerland.

824,206. Selective System; Reed. This invention is a selective system employing resistances of different strengths or opposite sign of battery current. The system permits the use of permanent ground branches from each conductor to contain the signal receiving annunciators. Patent unassigned.

824,251. Telephone System with Centrally Arranged Microphone Battery; Lambert. In this invention both the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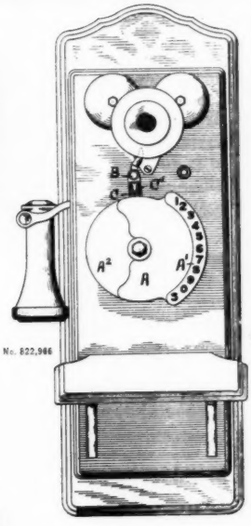
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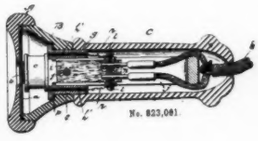
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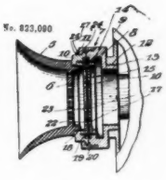
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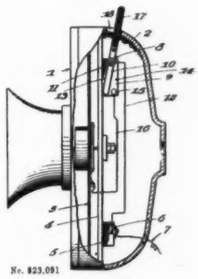
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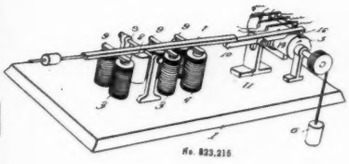
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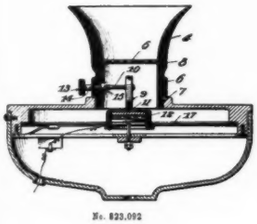
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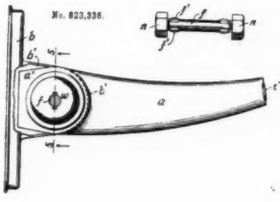
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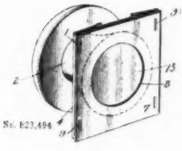
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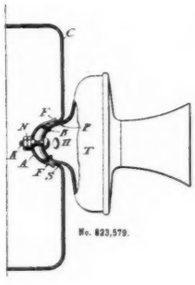
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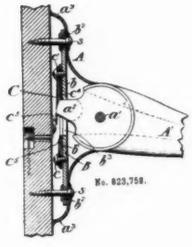
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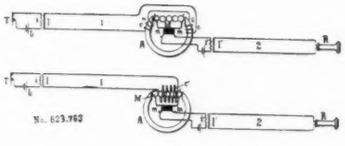
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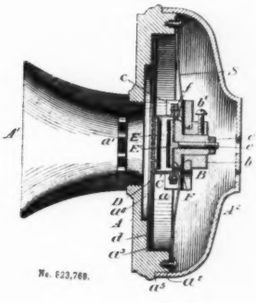
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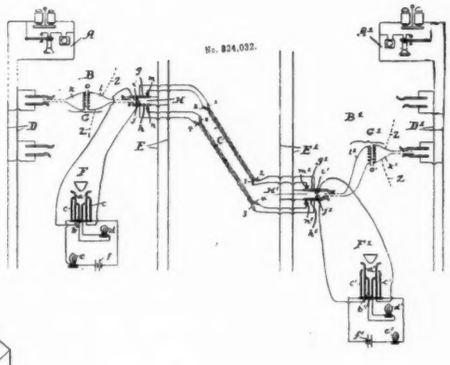
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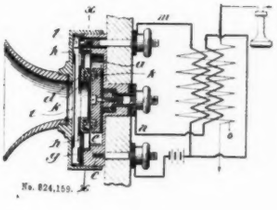
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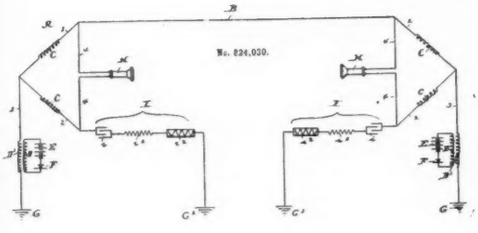
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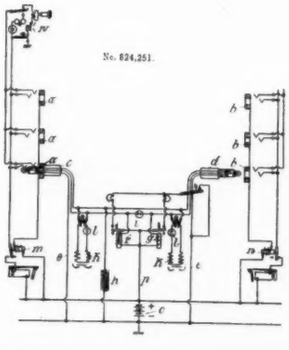
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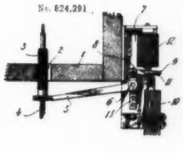

No. 824,291.

supervisory signal magnets are used instead of inductive resistances and are separated by polarization cells which prevent the passage of continuous currents while they allow the talking currents and the test impulse to pass without noticeable decrease in intensity. Patent unassigned.

824,291. Automtaic Telephone Key; Faller & Danielson. The object of this invention is to obviate the necessity of using a separate key for opening the path of the selective impulses and to use an automatic key which when the connecting plug is removed will establish a circuit automatically over which the group signals are received at the exchange section. Patent unassigned.

824,351. Telephone Switch Hook; Fricke. This is a switch hook stamped from one piece of metal and twisted into shape. One-half assigned to McMeen & Miller.

824,376. Telephone System; Ohnesorge. In this system the central station has a plurality of substations connected thereto in multiple by double telephone lines. Wheatstone bridges and choke coils are used at the subscribers' stations. Patent unassigned.

824,431. Telephone Switchboard; McCormick. This is a combined annunciator and line jack of the drop shutter type and is provided with mechanism to automatically restore the drop when the plug is inserted. Patent assigned to The International Telephone Manufacturing Company.

824,701. Multi-Party Line Exchange System; Babcock. This invention employs a central exchange, a plurality of substations, a make and break switching mechanism for each plug of the cord circuit and automatic means for operating said switching mechanisms to interrupt the current flow so as to send pulsating current through both plugs and to short circuit the cord conductors when the flow therethrough is interrupted. Patent assigned to The Stromberg-Carlson Telephone Manufacturing Company.

824,767. Telephone Exchange System; Webster. This is a trunking system in which the ringing signal is produced by the glow of a single lamp, and in addition he provides means whereby the signal code employed positively indicates to the trunk operator the operative condition of the trunk line at all times. Patent assigned to Stromberg-Carlson Telephone Manufacuring Company.

824,843. Operator's Key for Telephone Switchboards; Brown. In this key the operator is at liberty to ring up either of two connected subscribers but is prevented from "listening in." In other words she can ring either subscriber but cannot talk to either one while they are connected. Assignor of one-fourth to George H. Parmelee.

824,856. Telephone System; Fowler. In this system a relay is bridged between the limbs of a line and connected directly in the circuit with the substation generator. Patent assigned to the Sterling Electric Company.

824,980. Telephone System; Dean. This invention employs a simple relay and a supervisory signal lamp with a suitable retardation coil in series with the lamp in a bridge at each end of the cord circuit in such a manner that the lamp is lighted as soon as connection is established and rendered inoperative when a subscriber responds. This gives complete supervision at all times. Patent assigned to the Kellogg Switchboard & Supply Company.

825,055. Signaling Apparatus; J. C. Hubinger. This is a ringer having extensions projecting from the armature which carry adjustable balancing weights. Patent unassigned.

825,134. Attachment for Telephones; A. G. Kountz. This is an alarm device which is arranged so as to have its switching mechanism operated by the clapper of the telephone bell so that its circuit is completed and continuous ringing can be had at some distance from the telephone. Patent unassigned.

825,397. Telephone Hook Switch; Knight. This hook lever is pivoted upon a stationary pivotal point and carries a pivoted catch member which is adapted to prevent its removal. Patent assigned to the Williams-Abbott Electric Company.

825,406. Polarized Magnet Device; McGrath. This is a ringer having the bells disposed at right angles to the longitudinal plane of the magnet and the armature is pivoted upon the core. When a current is passed through the helix the core and the armature are magnetized, the polarity of the end carrying the armature depending of course upon the direction in which the current circulates in the helix around it. Patent assigned to the Western Electric Company.

825,424. Measured Service System of Telephone Exchanges; Scribner. This is a service meter which comprises an electromagnet having a plurality of actuating circuits, and means at the central office for connecting a source of current to any one of the said circuits so that the electromagnet will progressively work the register. Patent assigned to the Western Electric Company.

825,439. Special Busy Test for Telephone Lines; Winston. This invention has a varying current test producer adapted to be connected to party lines and a test receiving apparatus adapted to receive a varying current test over one path and a steady current test over the other path. Patent assigned to the Kellogg Switchboard & Supply Company.

825,487. Anchor; Cook. In this invention the anchor, instead of being pushed into a hole in the ground with projecting wings like others used for a similar purpose, is bored into the ground and when at a given depth the boring operation is reversed, it acts to throw out disc-like blades to engage to solid earth. It will readily be seen that this gives a double holding power due to the loose earth above the auger portion and the extension blades holding in the solid earth.

825,488. Push-Button; Schneider. This is a subscriber's signaling push-button of an ordinary type but provided with a hook for carrying the instrument, which is also connected in shunt with the normal signaling circuit. Patent unassigned.

825,496. Apparatus for Recording Telephonic Messages or Sounds; Starcke. In this invention a plurality of phonograph cylinders are successively brought into the desired recording position automatically. The beginning and end of each cylinder is announced to the users by a bell in proximity to the mouthpiece or diaphragm of the receiver. Patent unassigned.

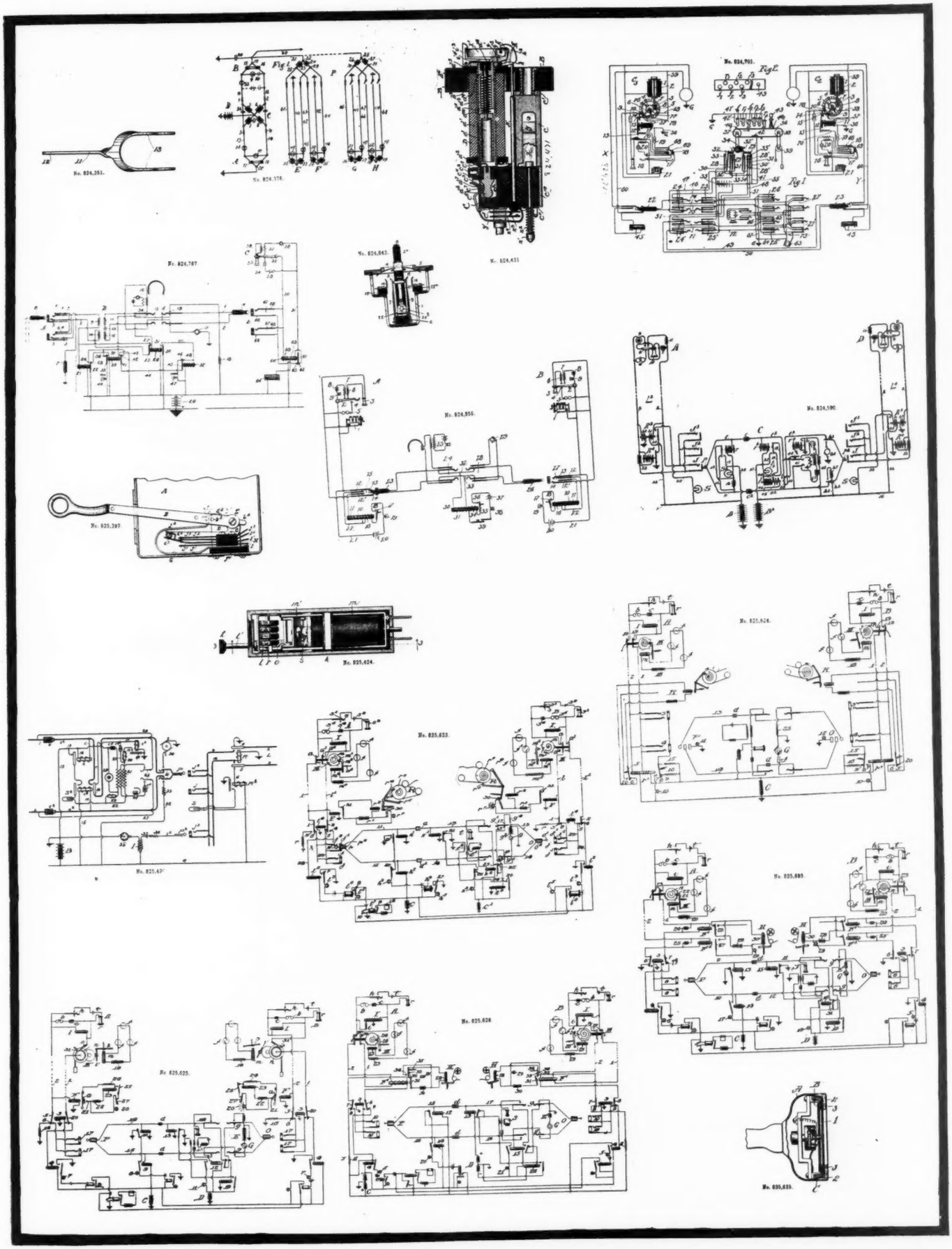
825,623. Combined Telephone and Alarm System; Webster. This is a common battery metallic circuit system of the bridging battery type with fire, police and burglar alarm devices connected to the lines. Current normally flows over each line but is too weak to effect the telephone signaling apparatus. The signals are sent on complete breaks. Patent assigned to Milo G. Kellogg.

825,624. Combined Telephone and Alarm System; Webster. As is the above, this also is a common battery metallic circuit telephone system with alarm sending apparatus interposed in the line. There is also mechanism which automatically indicates any derangement of circuits which would interfere with the signals. Patent assigned to Milo G. Kellogg.

825,625. Combined Telephone and Alarm System; Webster. In this case, which is similar to the others described, there are signal sending and receiving devices for each station and each one is provided with mechanism for making characteristic breaks. Patent assigned to Milo G. Kellogg.

825,626. Combined Telephone Exchange and Alarm System; Webster. In this invention the substations are provided with alarm sending apparatus and a current of unequal value for the two limbs of the line is maintained, and means for interrupting current so as to be responsive to individual signal controlling mechanism. Patent assigned to Milo G. Kellogg.

825,635. Telephone Transmitter; Brewer. In this



transmitter there is a main speaking diaphragm and a secondary diaphragm placed in front of it to prevent germ-laden breath from collecting in the transmitter. The voice vibrations are directed against the secondary diaphragm and are conveyed to the main speaking diaphragm by concussions of the air between. Assignor of one-half to William H. Nolker.

825,685. Combined Telephone Exchange and Alarm System; Webster. In this system which is a common battery metallic system there are provided alarm signal sending devices in the line and means for automatically indicating the accidental grounding of either limb or the telephone line which is independent of the indicator used for indicating the alarm signal. Patent assigned to Milo G. Kellogg.

THE ROMANCE OF THE TELEPHONE

An Interesting Description of the Possibilities and Value of the Telephone from Moody's Magazine

By H. C. Nicholas

Among the curiosities exhibited at the Philadelphia Exposition, which was held in the centennial year of 1876, was the first telephone invented by Professor Bell. With its huge leather transmitter and the pointed receiver, this instrument was viewed as a wonderful but useless invention. The first rudimentary telephone exchange was established in Boston in the following year. It was, therefore, only thirty years ago that the telephone was invented, and less than that since the first commercial exchange was established. And yet, to-day, the telephone is in almost universal use throughout the world, and at a rough estimate there are probably ten billion messages transmitted in the chief countries in a single year. In the United States alone there were over six billion telephone messages last year. The story of the development of the telephone during the last three generations reads like a fairy tale.

Certainly no other industry in the history of the world has had such a remarkable development in such a brief period. In 1880 the population of the United States was, in round numbers, 50,100,000, and the number of telephones of all kinds reported in the census for the year was 54,319. As late as the close of 1894 there were fewer than 300,000 telephones in the country. In 1902 the number of telephones reported by the census for that year was 2,315,000. In other words, while the population increased 56 per cent from 1880 to 1902, the increase in the number of telephones was more than 4,300 per cent. In 1880 there was one telephone for every 923 persons, while in 1902 there was one telephone for every thirty-four persons.

Astounding as this growth appears it has been far surpassed by the record of the last three years. Since 1902 the number of telephones has actually more than doubled. At the close of 1905 the Bell companies had outstanding 2,849,000 telephones. There were at least 2,000,000 telephones owned by the Independent companies, making a total of over 4,800,000 telephones in the country at the opening of the year. Moreover, far from having reached anything like the limit of its development, the number of telephones is growing at a faster rate than ever before. Subscribers are actually increasing faster than the instruments can be manufactured and installed. The manufacturers of telephones are working their plants night and day, and are yet unable to supply the demand. The Bell companies are increasing the number of their telephones at the rate of about 1,500,000 a year, Independent companies are showing an equally amazing growth, while new companies are springing up all over the country from Maine to California. Mr. F. P. Fish, head of the Bell companies, a few months ago made the prediction that the next three years will see the number of telephones in the country more than doubled. The present really amazing progress amply justifies this prediction, and by 1910 it is believed by telephone authorities there will be approximately 15,000,000 telephones in the United States. Before this maximum has been reached the indications are that the telephone will exceed the mail in the number of messages per day. The average rate for every class of telephone message is now about 1.7 cents, or less than the average rate for first-class mail.

The immense growth of the telephone system, during the last few years, is largely accounted for by the expiration of several fundamental patents, formerly controlled by the Bell companies, and which constituted the basis of their monopoly. The Bell companies were nearly twenty years in creating a demand for 500,000 telephones, whereas during the last five years, largely as a result of the Independent telephone movement, there have been installed nearly 5,000,000 telephones. At least 2,000,000 more will be added this year. To maintain their position the Bell companies have been forced to expand at an unheard of rate, and although they had a start of nearly twenty years they have already been outstripped in many sections of the country by the Independent companies. There is to-day an Independent telephone system in every state and territory in the country. In some sections the Independent companies have four and five times as many subscribers as the Bell companies, and they are rapidly building up a long distance telephone system which rivals that of their older competitor.

The growth of the telephone lines during the last few years has been the result of the purpose to extend the telephone to every town, no matter how small, throughout the United States; and in all of the cities and towns to place a telephone within easy and immediate reach of every person whose income is sufficient to permit him to ride on street cars. The extent to which this policy has been put into actual construction is indicated by the fact that, while the last census gave a record of 10,602 incorporated cities, towns, villages and boroughs, there is to-day telephone communication to 26,000 different settlements, and the extension of lines into new territory is going on as fast as the wires can be strung.

There is at the present time about one telephone for every twelve persons, man, woman and child, in the United States. Telephone authorities are looking forward to a maximum of one telephone for every five persons, and a system of long distance wires so complete and perfect as to place every subscriber in communication with every other subscriber throughout the land. Already there are approximately 300,000 miles of long distance telephone wires, representing an investment of about $50,000,000. These lines, if straightened out, would reach from here to the moon, with enough wire left over to encircle the earth three times. These long distance wires can be attached to lines about 4,000,000 miles in length in the different cities and towns, reaching out to about 7,000,000 subscribers. The banker in his office in New York or Boston without leaving his chair can call up and within less than five minutes be talking with the business man in Minneapolis, Omaha, Kansas City or Indian Territory. In the near future the long

distance wires will be completed through to the Pacific Coast, and the subscriber in Maine will then be able to converse with the subscriber in California. The small amount of electric energy required to carry on such a conversation seems almost incredible. The energy required for a single incandescent burner is 5,000,000 times as great as that required to send a telephone message from Boston to Chicago, while the energy required to lift a weight of thirteen ounces is sufficient to operate a telephone 240,000 years. The amount of capital invested in this country in the telephone industry to-day is over $750,000,000.

In the larger cities like New York, Chicago and Philadelphia, the telephone has become indispensable in the transaction of business. A temporary suspension of the telephone service would completely paralyze the business of Wall Street, and cause an almost entire cessation of business on the Stock Exchange. The general use of the telephone has enormously increased the capacity of the business mechanism. It is a far greater time saver than the telegraph or the railroad. During the last few years there has been a new phase of telephone growth. The larger business, law and banking business houses have been installing telephones in large numbers. The idea is to put a telephone on practically every counter or desk. Communication within the store or bank is free, an employe without leaving his desk being able to talk with any one in the store. The actual saving in time in this way is worth hundreds of dollars to a large business establishment in the course of a year. A single department store in New York has 1,500 telephones, another 800 and a number from 200 to 500. Scores of banking houses in Wall Street have from twenty to fifty telephones apiece. The telephone has not affected the transaction of business alone. In the larger cities almost every apartment house and private residence has a telephone. The ordinary social telegram is practically a thing of the past for short distances, having been supplanted by the telephone, and an increasingly large amount of the daily shopping is done every year in the same manner. Indeed, so widespread has become the use of the telephone in the larger cities that the telephone book has become a comprehensive business directory, besides containing the residence addresses of thousands of persons who keep telephones in their houses as well as their offices. Publishers admit that the greater convenience of the telephone book has seriously affected the sale of city directories during the last few years.

One of the interesting outgrowths of the telephone is the theatrephone, which is an arrangement whereby a person can hear all that goes on in a theatre or opera house by sitting in his home with the specially arranged double receivers at his ears. Experts have been experimenting with the theatrephone for several years, and have so perfected the system that it is possible to hear distinctly the lowest stage whisper or the softest note of an opera. The question has been seriously considered by one hospital in New York of installing theatrephones in every room. During the week the patients can hear the various operas and concerts, and on Sunday connection can be made with a church of any denomination and the patient can hear the sermon. It is thought that this would greatly aid the recovery of patients, besides softening the loneliness of incurable invalids. The practicability of the theatrephone has been thoroughly demonstrated, the only objection from the standpoint of the telephone companies being that if in general use it would tie up so many trunk lines as to seriously interfere with the regular service.

A company has been organized in New York to furnish electric music to be transmitted through the telephone to the home of the subscriber. Strings, reeds and other devices with which we have been accustomed to sound our notes are dispensed with. There is a battery of alternators, which will transmit musical electric waves, and these are adjusted to as many different vibrations as are the strings of a piano. To play the instrument a piano keyboard is used. The pressing of a key operates a switch which closes the circuit leading to the alternators adjusted to produce just the note that the piano string would produce. The wood-wind, brass and string tones of an orchestra are easily produced. Musicians who have heard the quality of the notes say that the delicacy of expression is remarkable. By the touch of the hand the performer controls the attack and sostenuto and varies the note at every instant. The imitation of the violin and 'cello is so perfect that the auditor can hardly believe that he is not listening to the bow gliding over the strings. The notes are not sounded in the ear of the performer operating the battery, the vibrations instead being communicated to the telephone wires which transmit them to the telephone receiver. There the note is sounded. The receiving telephones are fitted with a megaphone-like device, which carries the notes through a room as well as an organ could. One of the receiving telephones is connected with the operator, and he can thus hear how his playing sounds. In case of a large hall several instruments could be used, the fact that the notes having the same origin they would blend perfectly. The promoters of this company believe that eventually hotels generally, because of the very much lower cost, will install these telephones and use them instead of orchestras. It is also expected that they will be installed in private residences, when the subscriber can any evening call up central and order music for dinner or a dance or a concert for his guests.

Recently the telephone has been installed in restaurants, so that it can be used by the patrons at any table. It is on the bill of fare and is ordered with other items. The Pullman coaches of long distance trains are also being provided with telephones, which are connected by a jack and plug arrangement to the exchange system of the Bell company whenever the train stops for a few minutes in a city, thus giving the passenger an opportunity to telephone. Thus it is possible for a business man, whether traveling or dining, to keep in close touch with his office and his family.

One of the most striking features of the development of telephony has been the growth of rural lines. Even the rural mail carrier has been anticipated in many sections of the country by the telephone, and remarkable as has been the growth of the telephone industry in the wealthier eastern states it has been far exceeded by the growth in the west. Indeed, the census showed that in 1902 there were more telephones in proportion to the population in such western states as Illinois, Nebraska, Colorado, Michigan and Oregon than there were in Pennsylvania, New York or Connecticut. These rural lines are nearly all mutual companies, the lines and instruments being owned by the farmers themselves and being operated primarily for their convenience and not for revenue. Any deficit in the expense of operation is met, as a rule, by assessments on the owners, and the surplus, if any, is usually expended in improving the system. It is estimated that there are to-day more than 400,000 miles of telephone wires owned by rural companies.

On these rural lines a number of telephones, sometimes twenty or more, are connected with a single wire. Each subscriber has a different ring or "call," and the wires are in use nearly all the time. The uses to which these rural lines are put are almost innumerable. On the rural lines in Minnesota and South Dakota a daily telephone news service has been inaugurated. Twice a day, at noon and 7 o'clock, in response to a given signal, all the farmers on the rural telephone lines pick up the receivers, and the operator at the central office reads a brief summary of the principal news items of the day, just received by telegraph

from Chicago. In this way farmers living twenty and thirty miles from the nearest railroad or telegraph station receive the news of the world almost as quickly as dwellers in the great cities. The idea has proved most popular and is spreading into other western states. In a number of instances the telephone lines have been connected with the school houses. While the news is being received the children are given a recess, after which the teacher imparts to her pupils the news she has just received from every quarter of the globe.

The telephone has effected almost as great changes in the business methods of the farmers and planters of the western and southern states as it has in the great cities. Instead of hauling his wheat or cotton twenty or thirty miles to market, there to be forced to accept whatever price may be offered, the farmer now telephones to the nearest railroad station and receives the day's quotation. If the price is satisfactory, he usually closes the sale over the telephone before sending his produce to market. In this way the farmer and planter are in close touch with the markets of the world and are in a position to take immediate advantage of every favorable fluctuation in prices. Many of the large plantations in the south and ranches in the west have their own private telephone exchanges. The famous 101 Ranch in Oklahoma, extending over 87,000 acres, has thirty-five miles of private telephone wires connecting with every foreman. Without leaving his chair, the owner of this ranch can telephone to Chicago and close the sale of 10,000 cattle or 100,000 bushels of wheat, or call up and give directions to a foreman twenty miles away.

Having revolutionized business methods during its brief career, the telephone promises to play a prominent part in the wars of the future. In Europe stationary balloons, sent up to observe the movements of the enemy, are equipped with telephones, enabling the aeronaut to keep in constant communication with headquarters. In the previous great wars the line of battle was so contracted that the commanding general, with the aid of a courier service, could easily control and direct the entire field; but now, owing to the use of modern rifles, with a range of five and six times that of thirty years ago, the disposition of troops is over an area of so many miles that it is impossible for a general to direct the movement of his forces with the courier and signal service in use in previous wars. The army under Marshal Oyama, in its advance upon Mukden, was at times extended over an area of over two hundred miles, and yet the Japanese commander-in-chief was at all times in complete and immediate control of this immense army, directing the movement of the different divisions with a facility that astounded the world. This was rendered possible through the establishment of a telephone system which kept Marshal Oyama and his staff in constant communication with every part of the battlefield. The telephone lines were, of course, of the most temporary character, no effort being made in their construction for their preservation. Mr. M. C. Sullivan, who gives an interesting account of the signal service of the Japanese army, states that where possible the wire was reeled from wheeled vehicles, like so much rope, along roads and across fields. When the army advanced into wild country where the movement of wagons was difficult, the coils of wire were slung over the shoulders of the soldiers and carried great distances on foot. In this way the telephone department of the Japanese signal corps was able to complete its lines as fast as the troops moved.

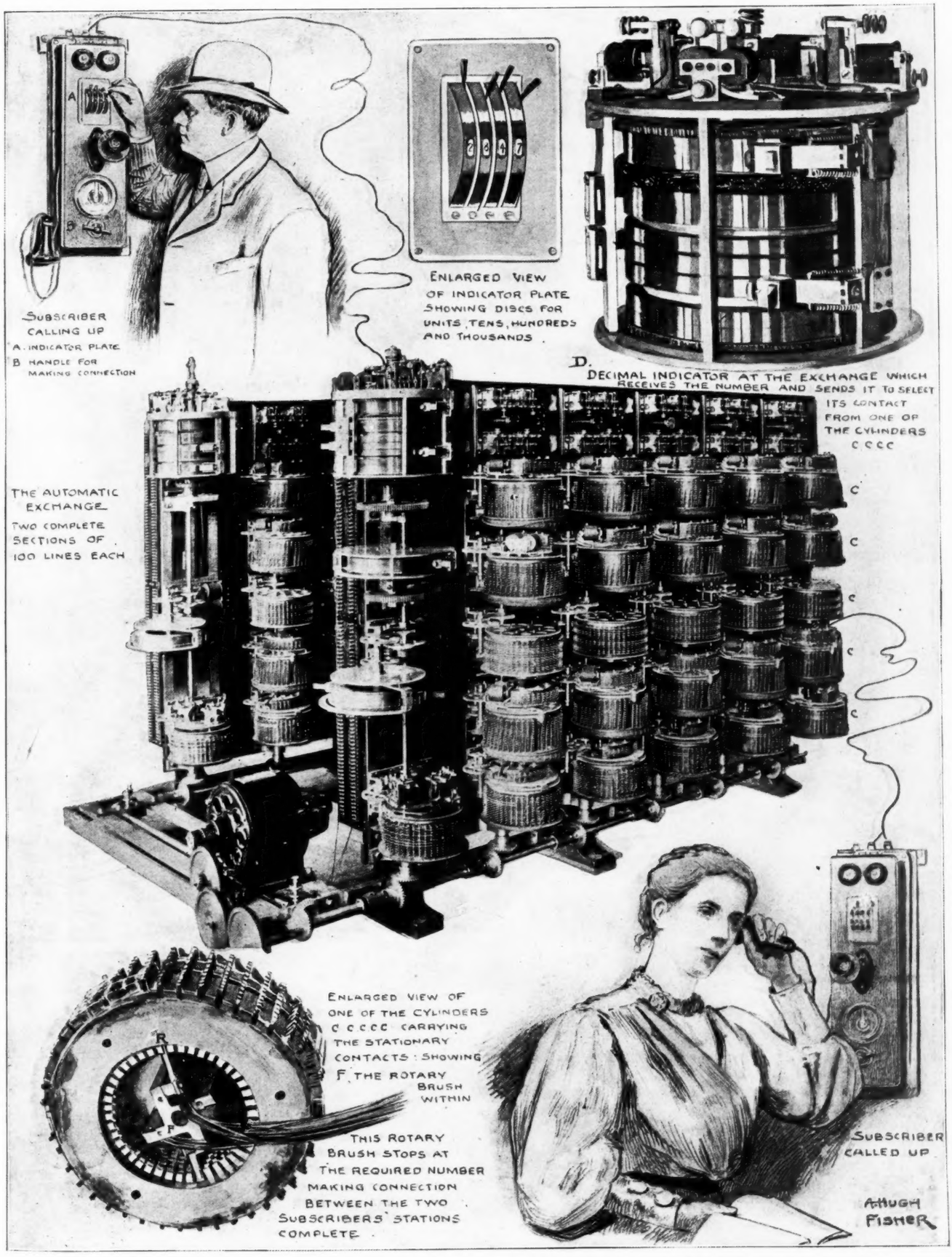
The use of the telephone unquestionably contributed largely to the success of the Japanese army. During the battle at Yalu an incident occurred which demonstrated the value of this instantaneous communication with all parts of the army, particularly during an engagement. When the right and left wings of the Japanese army, after crossing the Yalu, were closing in on the Russian flanks, the Japanese left found itself under fire of its own artillery. With their telephone system it was but the work of a moment to call up headquarters at Wiju, which was in telephonic communication with all of the batteries and have the direction of the fire changed, thus saving many lives and permitting the advance to continue.

THE LORIMER AUTOMATIC IN FRANCE

As described by the Paris correspondent of the London Illustrated News

HOW to do away with the telephone girl has long been a problem in telephony. To err is human, and the telephone girl is particularly human. She is often inattentive, and switches you on to the wrong number or pulls out the plug at a most interesting point in the conversation. Sometimes she never hears at all, and there is the fourth case when she murmurs "Engaged" to your repeated efforts to get through to the other man. The telephone girl, indeed, is required to be a machine—never to make mistakes, never to break down, never to be curious. Being only a woman, she cannot be these things. But a mechanical telephone girl, who is all this and more, has been invented by two Canadians, G. W. and J. H. Lorimer, who hail from the "telephone" city of Brantford. It was at Brantford that the Scotsman, Alexander Graham Bell, first demonstrated the practical utility of the telephone; and, by a curious coincidence, it is this colonial town that is destined to be associated with an invention that may prove to be the greatest since that of Professor Bell's. The Lorimer telephone, which I have seen at work in Paris, is in appearance very like that of the ordinary telephone—that is to say, the part visible to the subscriber in his own house. The primary difference, however, is that there are no batteries at the base of the instruments as in the London and Paris systems. The Lorimer telephone is entirely worked on the central battery plan—that is to say, the battery is at the exchange. This method is in use quite extensively in the United States. In order to establish direct connection with a subscriber, the pointers on a dial at the head of a machine are moved so that they stand over the exact number required. It is the familiar principle of the automatic cash register. The handle of the telephone is turned and a button is pressed, which rings in the room of the person called. This signal can be heard ringing through the receiver of the transmitting telephone. The line is instantaneously clear for talking. When the receiver is again hung up at the caller's telephone, at the conclusion of the conversation, the two lines are disconnected and the number is free for other subscribers.

What happens when the handle of the telephone is turned, and connection is made with the called subscriber? It is not easy to explain without recourse to technicalities, but some idea of the operations may be conveyed in general terms. At the ordinary telephone exchange connection between one subscriber and another is established by means of a switchboard. When the call comes for a certain number, connection is made between caller and called by means of a plug and a flexible cord. The Lorimer automatic ma-


SUBSCRIBER CALLING UP
A. INDICATOR PLATE
B HANDLE FOR MAKING CONNECTION
ENLARGED VIEW OF INDICATOR PLATE SHOWING DISCS FOR UNITS, TENS, HUNDREDS AND THOUSANDS.
D.
DECIMAL INDICATOR AT THE EXCHANGE WHICH RECEIVES THE NUMBER AND SENDS IT TO SELECT ITS CONTACT FROM ONE OF THE CYLINDERS C C C C
THE AUTOMATIC EXCHANGE
TWO COMPLETE SECTIONS OF 100 LINES EACH
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ENLARGED VIEW OF ONE OF THE CYLINDERS C C C C C CARRYING THE STATIONARY CONTACTS: SHOWING F THE ROTARY BRUSH WITHIN
THIS ROTARY BRUSH STOPS AT THE REQUIRED NUMBER MAKING CONNECTION BETWEEN THE TWO SUBSCRIBERS' STATIONS COMPLETE.
SUBSCRIBER CALLED UP
ARTHUR FISHER

The Lorimer Automatic Telephone System in Paris as illustrated in the London News.

chinery does that without the aid of a human operator. The system is made up of mechanical devices electrically controlled, each one of these devices corresponding in its functions with the single cord circuit in the manual switchboard. The machinery to perform these operations is divided into sections, each section being capable of serving a hundred lines. An instrument known as the decimal indicator, the principal part of each section, is constantly revolving. When the handle of the telephone in the subscriber's office is turned, a message is thereby conveyed to this revolving indicator. It is at once passed on to an automatic switch, of which there is a number in each section, performing the exact duties of the telephone girl. The number wanted is spelled out by the mechanical switches with remarkable rapidity, and the indicator is free, in the twinkling of an eye, to take up other work and to transmit other orders. In the event of more calls coming in than there are switches idle, the call is stored and distributed to the first switches idle, no greater delay than a few seconds being possible.

The machinery seems to do everything but think. Once a call is made, no other call can intrude upon the line, yet the mechanism will store the delayed call until the line is out of use, when it will make the connection asked for. No interruption in a conversation is possible, and no one but the persons absolutely engaged can hear the conversation. This is no mean advantage. It is certain that in a small community a man would hesitate to parley with his banker over the wire. But the Lorimer tells no tales out of—the circuit. Should there be any crossing or grounding of wires, automatic notice of it is immediately given to the exchange; consequently the defect may be remedied before even the subscriber is aware of it.

There is another very important point to be considered. If a community outgrows the telephone service, with the Lorimer machine it is not necessary to replace the entire switchboard. Merely another section is added for every hundred subscribers. These sections come away absolutely complete from the factory, and can be immediately installed. They can be added without the least difficulty to the original sections. The sections in the installation at work in Paris are operated by a small electric motor, but power may be taken from any convenient source, such as a rotating shaft or a gas engine. Control of the various parts is primarily electrical, but the work is done by direct mechanical means as far as possible.

THE PROPER NUMBER OF OPERATORS

By L. W. Carroll

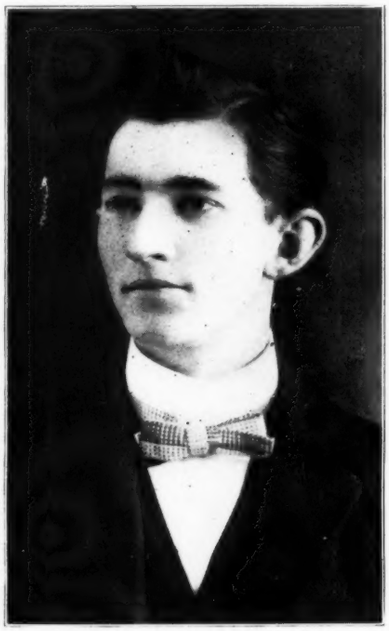
THE number of operators required to give satisfactory service is a question often asked, especially by managers of small exchanges. It is hard to give a rule that will cover all cases, as a great deal depends on local conditions.

First of all, the number of calls an operator can handle, and do justice to the patron and the telephone company, depends on what kind of system is in use or, in other words, whether the system is a ring down magneto or a lamp line common battery exchange with supervisory cord signals, and also whether it is a full multiple or a non-multiple with the customary cumbersome transfer trunk equipment.

Secondly, on how well the patrons have been trained to call by number, along with a directory kept practically up-to-date. This last statement may strike some readers as somewhat amusing, but it is a fact that the managers of over one-half of our small exchanges serving five hundred patrons do not insist on the patrons calling by number.

It might be well to say that this is very poor management, as it leaves the telephone company at the mercy of the present operators, for they know, as well as the manager should know, that it will take even an experienced operator at least three or four weeks to become at all familiar with the people's names and numbers. On the other hand, if the people were educated to call by number, the manager could in case of a strike, or other trouble, put in strange operators of experience and be able to give efficient service from the start. He could also break in "green" help in at least one-tenth of the time required if the subscribers did not call by number.

Thirdly, what the patron considers to be efficient and satisfactory service is greatly dependent upon whether or not there is competition in the field.



L. W. Carroll.

This last assertion is based upon the fact that the subscribers of a telephone company base their judgment on the service rendered by the competing company, using whichever gives the best service, as an ideal by which to judge the other.

Another problem which now presents itself is, how to proportion the proper number of operators to the varying load, so to speak, as there are very few exchanges that have anywhere near an even load line.

To do this, it is necessary first to ascertain the relative rates of calling for each consecutive half hour or quarter hour during the twenty-four. In the smaller exchanges every half hour between the hours of 5 a. m. and 11 p. m. will generally give sufficient information, it being for exchanges of from 300 to 1,000 subscribers that this article is particularly applicable.

After the rates of calling for the different periods have been ascertained, there should be a curve constructed something on the plan of the one shown in the accompanying drawing where the abscissa represent time of day in half hour periods and the co-ordinates represent the rate of calling per hour. It is well to count the calls for at least three days, and from these an average should be made from the results for like periods. The curves shown here were taken from an exchange of four hundred city subscribers and two hundred and fifty country or farm telephones all centering in a town of thirty-five hundred population.

Curve No. 2 is the result of the number of calls taken from the city subscribers' board, and curve No. 3 was taken from the rural board and represents only the number of calls made through central.

Curve No. 1 is the result attained by the addition of curves Nos. 2 and 3, and represents the total number of calls of the exchange as a whole.

It will be noticed by referring to curve No. 1 that there is a very sharp rise in the rate of calling between the hours of 7:30 a. m. and 8 a. m., which is caused by the arrival of the business men and also by the calls from the residence telephones to the markets and grocery stores, which is kept up until about 11:30 a. m., when there is a sudden fall during the noon hour, only to rise again as soon as the meal is finished and again to drop gradually till 3:30 p. m. This last low depression in the line seems to be on account of the very few business calls, and residence calls, owing to the fact that it is the period when social visits are being made.

The sudden rise in the curve about 4 o'clock is easily

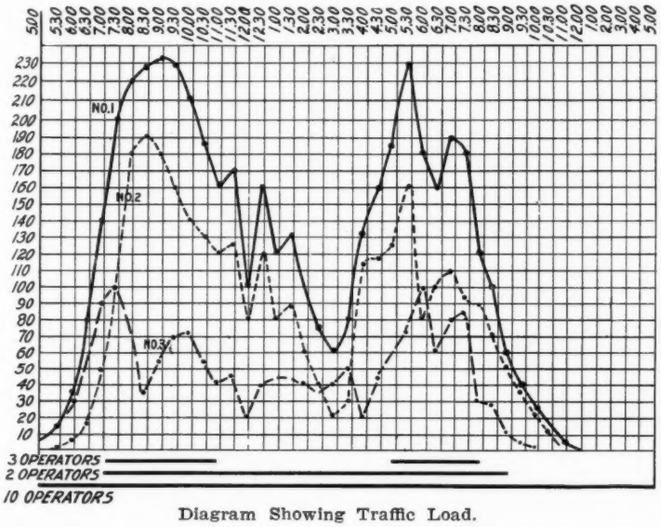


Diagram Showing Traffic Load.

traced to the extensive use of the telephone in this "young America" age by the pupils of our public schools.

The sharp peak at 6 o'clock I find upon investigation to be mostly calls from the housewives to their husbands reminding them to be sure and bring up the meat or butter and the many other little necessaries when they come home to the evening meal.

It will be seen by comparison of curves No. 2 and No. 3 that they are very much alike, except No. 3 has a considerable drop between the hours of 8 a. m. and 9:30 a. m. and that there is no sudden rise at 4 p. m., which is probably due to the school children not getting home until 4:30 or 5 o'clock.

The reader will probably note the fact that the farmer starts to call about an hour earlier and goes to bed about an hour earlier than his city brother.

After having constructed the curve as described, the number of operators should be adjusted to give a reasonable factor of safety in order to handle the slight irregularities which often occur in the rate of calling, such as fires and accidents.

On the exchange mentioned above, the following number of operators handled the board in a very satisfactory manner:

Two operators from 6:30 a. m. to 7:30 a. m. when another operator comes on, making three operators during the busy hours up to 11:30 a. m., when one leaves, and the board is handled by two till 5:30 p. m., when the number is increased to three until eight o'clock.

At eight o'clock one operator is dropped, another at nine o'clock, leaving one from nine o'clock until morning.

It will be seen by referring to the diagram how the busy periods are taken care of by the third operator. The heavy black lines at the bottom denote the time when there are one, two and three operators at the board.

THIRD CONVENTION OF THE VERMONT AND NEW HAMPSHIRE ASSOCIATION.

The Vermont and New Hampshire Independent Telephone Association held its third convention at Davidson Hall, Woodsville, N. H., July 10th, with large attendance. The convention was called to order by President H. W. Buchanan, of Barton Landing, Vt., who addressed the meeting as follows:

Allow me to congratulate you upon the success which has attended your efforts during the six months past.

The organization of the Vermont and New Hampshire Independent Telephone Association was a move in the right direction, for in union there is strength, and a blow at our universal enemy, the Bell Telephone Company.

We are growing stronger every day, and proving to our telephone patrons the superiority of Independent telephones for local service at a minimum price. We have now a union of companies reaching from Canada to northern Massachusetts, combining their strength to give better and cheaper service than our competitors. Each company is financially independent to work for its own success, and that success will be the success of this association.

There are, I understand, a few Independent companies in our territory, who so far have failed to join us and aid in our efforts to assist them as well as ourselves in fighting their mighty enemy. We hope before our next meeting they will see the error of their way and come with us.

The people are with the Independent companies, but to retain their confidence each company must run its business and on strictly business principles.

I hope that each of the companies who belong to this association will realize the importance of having their stock worth on the market one hundred cents or more on the dollar. That is, I believe that stock should never pay less than six per cent per annum, and if this can be accomplished, any company so rated can go on the market and secure funds to develop its business.

There are to-day thousands of Independent companies in the United States, operating three million Independent telephones against the Bell's two million five hundred thousand. These Independent lines have all been installed since 1894, or in the past twelve years, so if you will stop and consider just for a moment what this means—growing from nothing to operating more telephones than the mighty Bell, when it had the field for twenty-eight years, then cast your mind in the future for the next twelve years and see if you can conceive what may be the results.

If the monopoly had continued, there probably would have been not over five hundred thousand telephones in this United States. In New York City contracts have been signed by over two hundred and fifty thousand subscribers for an Independent company. When this company is in operation, how long will it be before the New England cities will revolt against high-priced service?

Everyone present is more or less interested in the success of this association and it depends wholly on you whether it succeeds or fails. The value of your property depends on its success.

The tactics of the Bell is well known to cut prices and give free service if necessary to kill out Independent companies.

I believe a committee should be elected, looking toward a law which will compel all telephone companies to give service without discrimination in prices in any place in Vermont or New Hampshire, wherever their lines extend.

I trust you will take up the business for which you have assembled with patience and care; that your deliberations may be thoughtful and earnest, and that no discord may arise and your conclusions may be wise and just.

Following the president's remarks the secretary's report of the last meeting was read, accepted, and adopted.

Many speeches were made by members of the different parts of the two states.

MARRIED BY TELEPHONE.

At Hattiesburg, Miss., June 1, a marriage ceremony over the telephone wire is the experience which J. W. Cowert of Pearlington, a well-known lumber buyer, and Miss Lula Ganalt of Darby, enjoyed.

The minister, Rev. J. A. Culpepper, lost his way, and, returning home at nearly 11 o'clock that night, he called the bridal party up by telephone, to explain his non-appearance, and pronounced the words that made the waiting couple man and wife. The ceremony is just as legal as if the couple had stood in the minister's presence.

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EDITORIAL DEPARTMENT

INDEPENDENT SECURITIES.

MORE and more every day wise capitalists are turning to telephone bonds as an excellent investment, and opinions agree that it is easier to sell $100,000 of this class of securities to-day than it was to find a market for a tenth of that amount but a few years ago. This is indisputable proof of the oft-repeated statement that the bonds of a well-managed telephone company are infinitely superior to nine out of ten securities as a permanent investment. It is a well-established fact that, in good and hard times alike, telephone earnings fluctuate less than those of nearly any other enterprise, and this one consideration is a guaranty that with good management the returns should be safe and satisfactory in the way of interest on the money invested. In fact, telephone bonds are regarded as more desirable than good water bonds by the shrewdest bankers.

The success of the rural telephone has had much to do with the rise of Independent securities to the point where they are called "gilt edge." When the farmer stamps his approval on an article it generally acquires an increased value in the eyes of investors, and the success of the rural lines undoubtedly went far to create a solid confidence in telephone bonds.

Government statistics show that of more than 6,000 telephone companies organized in the last ten years only forty-five have retired from business as unsuccessful. This means that only three-quarters of one per cent failed, showing that there were fifty per cent fewer failures among telephone companies than among national banks. Thirty of these were small concerns, operating in sparsely settled districts, some having only twenty-five instruments in service, while others had limited capital and some were handicapped by poor management. The steady increase in the general use of the telephone, making it a necessity—not a luxury, nor even a convenience—spells prosperity to the industry and just as surely and logically enhances the value of telephone securities.

Years ago there was a feeling of hesitancy about investing in railroad securities. In fact, in the early day of railroad development men invested in railroad stocks and bonds more to support a public enterprise and "help their town," than in the hope of making money for themselves. And now everybody knows that most of the great fortunes of to-day came from those who "loaded up" with railroad securities fifty years ago. There has been a similar conservative feeling with regard to telephone bonds, but it is giving way before a steadily increasing confidence in their stability. The statement has been made that it would take several years for an inefficient manager to ruin a telephone company, but that he could ruin a bank in twenty-four hours. The ratio of failures between telephone companies and national banks, as noted above, proves that this assertion is not so haphazard as it at first might seem.

BEWARE OF THE KELLOGG.

NO LOYAL Independent telephone operator should patronize the Kellogg Switchboard & Supply Company to the extent of a dollar, for the simple yet all-sufficient reason that the concern is a creature of the Bell monopoly. Though often preached this doctrine will bear repetition, for it involves the principle on which the safety and life of the Independent movement most depends. If for no other than purely selfish reasons, Independents should purchase no Bell-Kellogg apparatus and supplies. It is apparent on the face of things that, as the Kellogg company is owned and controlled by the Bell, every penny of profit made by the former corporation goes to the Bell to be used in its relentless, unscrupulous warfare against Independents. Could a more suicidal policy be imagined than to place a weapon in the hand of one's deadliest enemy? Yet that is precisely

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the foolish, short-sighted policy of the Independent who pays his good money into the Kellogg treasury.

But there is another side to the case: It is grossly unfair to Independent manufacturers to nourish and feed the Bell-owned Kellogg plant. Independent manufacturers are turning out just as reliable goods as is the Bell-Kellogg concern, and, what is more to the point, they are planning and striving for Independent success. "Millions for defense but not one cent for tribute" was the stirring and patriotic cry raised in the early history of our country. Let us paraphrase that to-day in the telephone field and proclaim: "Millions for Independents but not one cent for the Bell."

The boycott sometimes is an awkward weapon to employ in a fight, but if its use were ever justified the Independents are warranted in applying it to the Bell-Kellogg concern. No trick has been neglected by the Bell in waging its desperate battle against Independent success, and the absorption of the Kellogg plant undoubtedly was stealthily accomplished with a view to fighting the Independent movement from a new point of attack. The only way to block this phase of the Bell game effectively is to shun the Kellogg concern completely, as recommended in the resolutions adopted by the national convention. In the event the Kellogg company again passes into the control of friends of the Independents, there will be time enough to revise this policy. Until then, however, TELEPHONY is firmly convinced that not only horse sense but even the primal instinct of self-preservation demands that Independent owners and operators close their doors to Bell-Kellogg agents.

Independent custom and Independent money should go to Independent manufacturers and to no others.

THE NEW ORLEANS FIGHT.

NEW ORLEANS has finally awakened to a realization of the shady methods whereby the Bell company operating there manipulated the city council to obtain an exclusive franchise, and there is talk of a grand jury investigation which is likely to throw more light on Bell tactics. With an alacrity which smacks eloquently of graft, the council granted the Cumberland Telephone and Telegraph Company (Bell) the exclusive right to operate in New Orleans for three per cent of its gross receipts from rentals per year, regardless of the fact that Chas. B. Stark, a competitive bidder, offered for the same privilege compensation of $100,000 a year. The Cumberland company figured that its percentage would yield the city between $12,000 and $15,000, and the good people of New Orleans are asking why their councilmen nonchalantly tossed away $85,000 per annum, which would have come in very handy in meeting municipal expenses.

A shrewd answer to this query is given by Louis F. Post in The Public, under the suggestive caption "Corruption in New Orleans." Mr. Post says:

> Even New Orleans does not escape the business corruptionist. The city council there has given a telephone company the right to operate for $12,000 a year, to the exclusion of a competitive company offering $100,000. Besides this large difference in bonus, the competitive company offers to reduce tolls from $120 to $84 and to deposit city, state and national bonds in adequate amount, to be forfeited for non-fulfillment of its contract. But the council drove out this competitive company. It did not belong to the Bell combine; the one that got the franchise did. There is no direct evidence, to be sure, that anything passed between the successful applicant and any one having influence with the council; but—well, circumstantial evidence has uses.

By methods peculiarly its own—yet not unfamiliar since the exposures of graft began—the Bell company induced the council to reject the proposition of the Independent bidder although he stood ready to give the city an infinitely better bargain and deposit a sufficient bond of $50,000 to guarantee its fulfillment. For the privilege of competing with the Cumberland Bell Mr. Stark agreed to pay the city 5 per cent, not only on the gross receipts from rentals (on which the Bell offered to pay 3 per cent) but from all sources of income; also to invest $2,000,000 in the best plant possible to build on which the municipality would realize $45,000 in taxes and license fee, and create a competition that would result in lower telephone rates and better service. The negotiations prior to the capture of the city council by the Bell concern showed that the monopoly is squeezing a twenty-nine per cent net profit out of the New Orleans public on its investment of less than $1,000,000. The New Orleans situation shows how hard pressed is the Bell concern by the Independents. It also shows what the monopoly will do when pushed to hard straits and compelled to fight for its ill-gotten right to oppress the public. Its impudent offer to throw a sop of $12,000 to the city it is annually robbing has set people to thinking, and the chances are that New Orleans will yet force the municipal authorities to open the door to the more liberal offer of the Independent bidders.

STANDARDIZATION OF EQUIPMENT.

ONE of the avowed purposes of the Interstate association, merged with the National association and now passing from view with the coming of the International association, was to make itself a militant agency for the reduction of Independent telephone equipment to a single dead level by fixing upon a single standard to govern each of the various kinds of things entering into a telephone system. The National association has given attention to this subject since the passing of the Interstate, and as a body took no exception to the last report of its committee on the subject. Without for a moment overlooking the fact that a single type of equipment can be manufactured at a lower cost and therefore sold at a lower price than can a number of types, even though differing from each other but little, it is not to be denied that there is danger of laying down standards too early in the development of any art.

Just at this time in our business, to fix a set of standards and bring all operators to using it, would certainly remove from manufacturers the incentive to produce new types of greater efficiency or lower price than previous ones. From the manufacturer's point of view there naturally can be no pleasure in viewing a prospect of standardization. It is possible that if all of them were interviewed each would say that he approves of standardization if his entire line of equipment, and his only, were to be selected as the standard. Under no other circumstances would he probably be willing to assist the movement in any way.

About the only sure method of providing the Independent operators with a single general system of equipment would be to bring all the Independent manufacturers into a trust, and it seems entirely likely that nothing else would disgust and enrage the operators quite so much.

THE UNIVERSAL TELEPHONE.

IT IS an undeniable fact that the use of the telephone has become so universal, while reviews of its amazing development are so familiar, that few realize what a necessary adjunct of modern civilization it really is. Telephone history has been made so fast that even the men most closely identified with the industry do not appreciate its marvelous progress until forcibly reminded by some new and startling evidence of its magic growth. Then they look back and, recalling that only thirty-one years ago the telephone was a hazy, uncertain experiment, admit the truth of the statement that the annals of the telephone read like a fairy tale. Even a meager outline of its wonderful development is sufficient to convince the most unimaginative that the possibilities of the telephone are limitless, while each step in advance opens new vistas revealing uses as yet not even dreamed of.

Thirty years ago the idea that one could talk over a wire to a person miles away was considered by the layman more

impracticable than the notion is to-day that we soon will have our own private flying machines and go sailing through space, scorning the aid of the street car or even the automobile. To-day the telephone is as essential to modern life as the government mail, and Uncle Sam's postal service has been distanced by the telephone in point of speed and satisfactory communication generally. Several billions of telephone messages flash over the telephone wires every year and the average cost is less than the government mail rate.

Perhaps the most significant feature of the development of the telephone is the striking way in which its utility is being extended in all directions. Like a magic cure-all it is being applied to all branches of human activity. On railroad trains and ships, in theaters, restaurants and hospitals, wherever people are gathered—sick or well, on pleasure or business—the telephone has been installed and has met with welcome and success.

Its practical use in churches has been indorsed by both clergymen and congregations. Telephone connection between hospital wards and concert halls has enabled bedridden patients to enjoy music and for a time forget their misfortunes. An article in this issue of TELEPHONY describes a new telephone invention which even enables the user to see the face of the person at the other end of the line. Thus the hearing telephone has led to the "seeing" telephone. The question suggests itself: In the process of evolution will not these two lead to the tasting and smelling and feeling telephone? Certainly nothing seems impossible to the daring genius of the telephone exploiter.

Moreover, the number of telephones in use is doubling every few years. When the fundamental patents expired and the Independent companies entered the field the cost of telephones was reduced, and competition soon enabled all classes to profit by the useful invention. If the man who makes two blades of grass grow where but one grew before is entitled to gratitude, certainly the Independents deserve infinite credit for the multiplication of telephones. The Independent movement every day is entering fields where the Bell has had a monopoly, and the glad welcome which the people extend is conclusive evidence that they will hold their own wherever they cross swords with the Bell. Exclusive control of territory encouraged the Bell companies to adopt a grab-all policy which proved burdensome and galling to telephone users. They now regard the Independents as their emancipators from the clutches of a greedy trust, and the result has been the overthrow of the Bell in many of its strongholds.

The Independents in eleven years have done infinitely more to popularize the telephone than has the Bell in its whole existence—that is to say, in nearly thrice that period. As a pebble dropped into a stagnant pool causes a commotion which send ripples in ever-widening circles, so the entrance of the Independent companies has stirred the telephone field to new and broadening activity. In fact, the operation of the Independents marked the opening of the real era of progress in telephone development.

IS GONDEN A BELL HIRELING?

AS A rule Independent telephone men are too busy providing for the wonderful growth of the industry to pay much attention to the vaporings of that section of the press subsidized by the Bell monopoly, but the attacks emanating from H. J. Gonden warrant severe adverse criticism. TELEPHONY directed attention some time ago to the inaccurate, misleading articles which appear over Mr. Gonden's signature from month to month in the Bulletin of the League of American Municipalities, and, acting on our suggestion, the Chicago convention discussed that individual and his misrepresentations and placed them both on the gridiron where they broiled under the heat of a righteous indignation. For five straight months Mr. Gonden obtained access to the pages of the municipal journal for the palpable purpose of discrediting Independent telephone securities, and throwing mud at the construction, management and service of Independent companies. Running through every line of his articles is a knock for the Independents and a boost for the Bell. In fact, the most casual reader would have no difficulty in detecting the hand of the Bell guiding the Gonden pen at the turn of every sentence. To be plain, Mr. Gonden exposes his hand. There is a Bell-like ring to his criticisms that cannot be mistaken.

TELEPHONY'S original comment on his crusade against the Independents led Mr. Gonden to pay a visit to this office, where, in the course of an explanation—which did not explain, by the way—he admitted that the Bell at one time had purchased 3,000 copies of the Bulletin of the League of American Municipalities containing one of his diatribes against the Independent movement. This statement fully confirmed the well-founded suspicion that the Bell regards the Gonden literary output as ammunition to use in fighting Independents. The testimony offered by Messrs Critchfield, Bellamy, Kline and Norton on the floor of the Chicago convention made a plain case against Gonden and convicted him of circulating not only misleading and unfair but absolutely untruthful reports concerning the Independent telephone movement. Moreover, Mr. Bellamy—who lives in Des Moines and therefore obtained his information at first hand—declared that John MacVicar, the publisher of the Bulletin, is an enemy of Independent companies. As Mr. Bellamy said: "Nobody from Iowa will find any fault with condemning John MacVicar. . . . We are willing the Lord shall have him any time he wants him."

Throughout his articles Mr. Gonden shows the Bell hoof by the ill-concealed glee with which he dilates on isolated cases of Independent troubles which he refers to as "long lists of Independent fiascos." His vicious attacks because the Independents have made lower rates than the Bell nullifies his disguise, also, for while condemning the Independents, Gonden presents an argument which, plain as day, favors the Bell's policy in every particular. In short, it now is very apparent that Gonden can no longer masquerade as an impartial critic of conditions in the telephone field. He stands to-day in the eye of every intelligent man as an advocate for the Bell monopoly, and his misrepresentations of the Independent movement should hereafter be so interpreted.

FRANK AND FEARLESS.

MR. P. T. BARNUM used to say that the American people loved to be humbugged, but in spite of his remarkable success in living up to his convictions, it is not so certain that any interest can successfully fool all the people all the time.

The easiest way to avoid being disturbed in one's mind through the iniquitous practices of the Bell telephone trust in the use of its publicity bureau, would be to dismiss the matter with a shrug of the shoulders, and continue to give a reputable telephone service at a reasonable price. But the situation demands more attention than that, because there is a fair-sized portion of every community which believes what it is told on any subject about which it has no very particular information.

Therefore it would be well that such a public be told the truth, and it is not being told the truth strongly enough so long as most of the telephone literature is being contributed by the trust.

As an offset to the glittering generalities telegraphed from one part of the country for publication in another where the facts are not at hand, the more progressive Independent operators are showing a gratifying increase in their departments of publicity and promotion. A clean-cut and reasonable example is the following, which is quoted with

substantial exactness from a half-page advertisement forming one of a series now being carried in the daily papers of an important city in the middle west:

The Bell telephone trust's patents expired in 1894.

For the eighteen years preceding, the trust pursued a policy whose blighting economic effects were frightful.

The trust's own records show that at the end of the eighteen years, or in 1894, it had but 291.253 instruments in service.

In eighteen years the monopoly had put out less than 300,000 telephones for this progressive nation.

Think of it!

The highest possible rates, the greatest profits, the very least outlay, poor apparatus, inferior service—that is the dismal record of the trust regime.

Note the change caused by competition:

June 30, 1906, there were over 5,000,000 telephones in operation.

Of this number over 3,000,000 were placed by the Independent home companies.

In eleven years the competition of the Independent home companies gave to the United States seventeen times as many telephones as had been given by the Bell telephone trust in eighteen years.

The object of the Home Telephone Company is to give our people their rightful share of telephonic benefits so long denied by the trust.

According to the local branch of the Bell telephone trust, your friends and neighbors who have organized the Home company for that purpose are "gold brick swindlers," "thieves," "scoundrels" and "robbers."

Can you agree with that view?

If not, give your support to the Home Telephone Company, which is thus benefitting its home city.

Good stuff. And it is bound to pay.

THE ORIGIN OF HELLO.

A CORRESPONDENT of the New York Times says: A distinguished scholar and philologist writes me the following, which may be of interest to your readers: "'Holler' is the word halloo in its proper form, and halloo is a root common to all Indo-European languages The root is spelled, in the comparative grammar of the Indo-European language, by Heinrich Fick, HLU, and is pronounced almost exactly, h-loo. It appears in whole classes of words signifying to call (call itself being derived from that root), and to hear and meaning very nearly, 'stop and listen to me.' The first word in the old Norse Edda is HLIOTHS, and it means a listening silence, so that the concrete meaning of halloo is to be in state of listening silence, or 'be still and listen.' I think that this is one of the most interesting philological contributions to the literature of the telephone, illustrating the exact meaning of the word 'hello.'"

EVANSVILLE'S DUTY.

THE Citizens' Telephone Company of Evansville, Indiana, has a franchise pending before the council of that city which should receive the unanimous vote of the city fathers. The people of Evansville are a unit in asking relief from the Cumberland Bell, and the business men of the city, appreciating that Evansville is losing trade, want an Independent system to give them connection with the 200,000 Independent telephones in Indiana. Evansville is the only county seat in the state without an Independent system and the advantages of Bell competition are so apparent, that unless a franchise is granted by the present administration the voters will elect a new set of aldermen who will give the city what it desires. At the recent state convention of Indiana Independents a telegram of greeting was sent to the mayor and board of public works of Evansville for the encouragement given toward the establishment of an Independent system in Evansville, and the secretary sent to the Evansville common council the following petition of the association:

The Indiana Independent Telephone Association, in convention assembled, representing 150.000 of the 200,000 Independent telephones in the state of Indiana, operated by 400 different companies with an estimated capital of $20.000,000, respectively petition you to grant the Citizens' Telephone Company of your city a franchise which, while it safeguards the rights of the city will permit the Independents to have connection with and entrance into Evansville.

Every county of the state is included in this convention, composed of 175 representatives. We deem it almost inexplainable that Evansville, the second city of the state, should be the only county seats of Indiana having no Independent exchange. The more surprising does it become when we consider that the Independent subscribers in this state out number the Bell five to one and that there are forty county seats with not even a Bell exchange franchise and several where Bell franchises exist have exchanges numbering less than seventy-five telephones in all of which the Independents have large systems.

We desire to call your attention to the report of the Commercial Club of Indianapolis under date of May 5, which reads as follows:

"We thoroughly believe in the desirability of competition with the Bell Telephone Company in the telephone business in Indianapolis, and we fully realize the benefits which have been derived from competition through this Independent company in the past."

This association, knowing that it is to the interest of Evansville, as it has been to the interest of Indianapolis, to have competition in the telephone business, request that an Independent exchange system be admitted which will insure the gates being opened to Independent toll lines, thereby giving your city telephone connection with the great body of Independent telephones throughout Indiana, Kentucky, Illinois and the entire Mississippi valley.

Mr. Lindemuth, president of the Indiana Independent Telephone Association, in an address before the International Independent Telephone Association of America, held at Chicago, June 26-28, said in part: "I think that this association should aid any of the Independent companies where they are making an effort to secure an Independent franchise in any town or city. In the city of Evansville it has been an open question for some time, and they are trying to secure a franchise for the Independent company, and I think the endorsement of this association should be given. I have a resolution, and I will read it:"

Resolved, by the International Independent Telephone Association in convention assembled at the city of Chicago, June 28, 1906, that it send greetings to the mayor, board of public works, and common council of Evansville, Indiana, respectfully urging upon them the importance of granting a franchise to an Independent telephone company in said city, in order that the citizens in said city may enjoy the benefit of modern and efficient telephone service at reasonable cost, so that the vast number of Independent telephone users throughout the United States may be enabled to have telephonic intercourse with the citizens of said city over Independent lines.

This resolution was unanimously adopted by the convention. It will be seen then that the citizens of Evansville want an Independent telephone company. The telephone users of Indiana want connection with Evansville, and the International association is anxious that Evansville enjoy the benefits of Independent telephony and be freed from the tyranny of the Bell monopoly.

Senator Fa Follette of Wisconsin in an address delivered July 7 before the Evansville Chautauqua said to the citizens of Evansville:

"Have you a representative government in your common council? I understand that sometime ago an Independent telephone company which asked to come in here and build and operate a telephone plant was denied a franchise by your council. The Bell Telephone Company must be in here. We had the same fight in Wisconsin, where the Bell company was extortionate and tried to crush out the Independent. Wherever that principle asserted itself in Wisconsin we have combatted it."

In an interview with a representative of TELEPHONY Senator La Follette expressed surprise that a city council should deny an Independent telephone franchise, for the reason that a monopoly of public service utilities was not compatible with representative government.

The Evansville council should heed the advice of a man like Senator La Follette, who is a champion of the people. It should respect the wishes of the telephone users of Indiana and of the citizens of Evansville in granting a franchise to an Independent telephone company.

We hope to announce in the September TELEPHONY that Evansville has granted an Independent franchise.

DISCIPLINE IN THE SWITCH-BOARD ROOM

Paper Read Before the Illinois Convention at Peoria

By Miss T. Barnes

A HIGH-CLASS service in an operating room is the fruit of good discipline. Obtaining good discipline does not imply that the operators have learned a book of rules and passed a satisfactory examination on the same. It is not sufficient that they know what is right, it is the doing what is right that brings about good results.

The selection of girls for operators is the first important step. Great care should be taken to know positively that they are of good character, as experience has proved to me that girls of good character are more liable to have the company's interest at heart. In protecting themselves from reproach, they are also protecting the company.

Miss T. Barnes.

One of the first things for a young woman to learn, who wishes to press into the world's labor market, is its supremacy over all other matters. Very few young women who apply to me for a position have learned this first and most essential lesson. Unless an operator is willing to recognize the imperialism of business in the telephone world, she is never successful; she invariably grows uneven in her work, half hearted, uninterested and is not regular in attendance or punctual. She soon becomes a disturbing element among operators who obeyed the rules contentedly previous to her appearance in their midst.

Attendance in any line of work is important, but especially so in the operating room. It is not an easy matter for another to pick up the thread in the loom of business that someone has dropped, and go on weaving the same pattern without a broken thread or perhaps a tangle of threads. Each operator is assigned to a certain position for a stated number of hours of the day. In the course of time she becomes familiar with the wants and peculiarities of many of her subscribers. It has been advocated by other companies that it is not best for an operator to become attached to or interested in any position, but I have experimented both ways and find that to make an operator become interested in her work and regular in attendance it is well to assign to her a permanent position and let her become thoroughly familiar with the wants of the subscribers on that position. The importance of attendance can readily be seen when each operator has 150 subscribers that she understands better than anyone else. As every wheel in a watch has its own little work to do, no matter how unimportant, the watch will not keep good time if any wheel fails to do its part. Complaints of service usually occur on a position where a regular operator is absent. An operator must, during certain designated hours, become to an appreciable extent a cog in a great machine, an obscure yet not unimportant factor.

After attendance, I consider punctuality next in importance. An operator should be thoroughly impressed with the importance of this rule from the moment she enters the operating room as a student. If the morning finds her longing for sleep right up to the edge of her working hours, she must not allow herself one moment beyond her usual hour for rising. From a strict observance of this rule operators are soon impressed with the fact that until they arrive there is a halt, as they must report for duty in the dressing room at five minutes of the hour. The chief operator gives three signals from her desk, beginning at five minutes of the hour, to operators in the dressing room. The first signal at five minutes of, is a warning bell; the second signal, at three minutes of, means to form in line in order of position at switchboard, and the third signal, at two minutes of, means to pass into the operating room and stand at right of operator to be relieved. The chief operator than gives three more signals, the first for operators who are to be relieved to pull receiver plugs, step back and form in line to pass out; the second signal is to pass out, and the third signal for operators on duty to draw in chairs and be seated. If any operator is missing at the second signal in the dressing room, the line is held. If she comes running in at the last minute, all out of breath and drops into place in line, she feels, although not late, that her day is started wrong. If she fails to arrive in time to form in line with the others, she must pass in alone. Nine cases out of ten, an operator dreads this ordeal more than any lecture that could be given her, as the very silence in the room is a reproach to her. Operators rarely pass in late without walking up voluntarily to the chief operator with an explanation. It is not that an explanation sets them right on their deportment card, but it sets them right with themselves. I believe they would rather I gave them a good lecture than for me *not* to say anything. The reproach that silence gives is often more effective than words. It brings to mind the story of the little boy who decided to leave home secretly one bright morning, to join a "Buffalo Bill" circus. All day he dodged and hid from every familiar face, dreading the possibility of being taken home by a father or a big brother. When the evening shadows were dropping silently over all, and the stars coming out, he thought of the little home on the hillside and wondered what they were all doing there. It does not take a young boy long to get very homesick and combined with hunger, there is only one desire left. So home he went. He crawled up to the window and looked in. There sat father, mother and sister reading. Had they not missed him? Did they not care? Even the old cat, stretched out before the grate, looked the symbol of contentment. The boy opened the door softly, stepped inside, and waited to be greeted. No one looked up although he knew that they heard him enter. Silence was beginning to be unbearable. If they would only speak to him! At last he made up his mind to speak to them, so he edged up to his little chair and sat down saying, in a very much surprised manner, "I see you've got the same old cat."

It is a strange thing that young women, who give so much thought to their personal appearance, should give so little thought to the training of their voices for ordinary conver-

sation. It occurs to me that is the most noticeable thing about a young woman. No matter how pleasing her appearance, or otherwise, her voice appeals to me before anything else. One always experiences a feeling of disappointment when a pretty young woman speaks in a harsh, loud and discordant voice. The last impression is impressed on the memory and her appearance fades from our thoughts. The training of the voice to become soft, low, melodious and to carry well is the most difficult lesson an operator has to learn. If her voice is naturally low and musical, she has only half of her lesson to learn. To be able to throw her voice into the transmitter, without any seeming effort and without any loss of sweetness or expression, is an art in itself, when fully acquired. Operators are trained daily on certain phrases and are allowed to use no others in their dealings with the subscribers. It is desirable that the subscriber shall become accustomed to uniform methods of dealing with the operator, as it tends to prevent unnecessary conversation, thus increasing the speed and uniformity of the operator.

We keep a daily deportment card and regulate the operators' hours and salaries according to records taken from the same for the monthly report. When the monthly report is made up, the operators who have been able to keep their names free from any marks on the daily card are subject to a raise in salary, or day hours at the first vacancy. In this way we weed out the careless and incompetent operators in our service. If an operator has reached the best salaried position, it is because the deportment card shows that she is entitled to the same. If after reaching this point an operator should drop in speed, voice or deportment (which is very seldom) she must step back and let someone pass above her. After an operator has been in the service for a few weeks, she realizes these important facts, that if she wishes to make a good salary, she must be regular in attendance, punctual in reporting for duty, cultivate a sweet, soft voice, and carry out all of the rules according to the instructions she has been given. An operator is not allowed to remain in ignorance of the rules. Failing to carry out the rules, when due to thoughtlessness, is excusable to a certain extent. Should an operator show a disposition to disregard the rules, we do not allow her to take up our time very long.

Correct cord handling is a difficult lesson to learn. The operators are taught that there is only one way to handle cords and that is by taking the plug between thumb and first two fingers, and inserting and disconnecting with the hand in this position, never allowing any pressure of the hand on the cord near the plug. She is not permitted to drop a cord to the table. I rarely see a case of incorrect cord handling any more.

The information operator's duties consist in looking up numbers, names and addresses that the local operator has no time for. Information must be able to answer almost any question that should be asked her: "What show is in town to-night?" "Information, this is No. 1735, Jones, the undertaker, if any business should come for me I am spending the evening at 165 Third street. Will you see that I am called there?" "Information, could you find out who is talking to her." These are a few of the many questions she is asked every day outside of her regular duties. The information operator is supplied with a loose-leafed double indexed directory, a card record, a city directory and a railroad time table.

The rural operator's duties are particularly adapted to an operator who is tactful, courteous and thoughtful. She must know the weather predictions and be able to tell whether Smith's people have called in to-day. She must remember if the Smiths are at Jones', providing she is unable to raise anyone at Smith's telephone. There is a sort of freemasonry friendship existing between the rural subscribers, and "central" is considered as one of them. The rural operator receives many useful presents such as sausage, bacon, strawberries, apples, cherries, etc. The rural subscribers dread the thought of losing their "farmer" girl as badly as they dislike to part from a good friend.

This is a season of baseball and we can furnish you the score of any baseball game in the "Three Eye" league and all local games. Each operator keeps a score card and records the innings as they come in. Every operator has a list of subscribers to furnish the score to, as nearly every drug store, saloon and cigar store keeps a score card in its window and gets each inning directly from the Inter-State operators.

Operators are frequently given speed tests to ascertain which is the swiftest. These tests are more often taken on the evening service where the positions are not all filled, and especially when some operator is absent or taken ill and her place is left vacant. The operator who answers the most calls is excused an hour earlier than usual. It keeps them all on the alert and thus the absent operator is not missed.

Courtesy to their employers, to each other and to the patrons of the company, is a point strongly emphasized. An operator who lacks courtesy among those with whom she is daily associated should not be trusted to handle the business of the company.

We do not always find girls of sweet disposition to work for us, but we do find many who after they have been with us a while try to cover their bad points, if they do not efface them altogether. Margaret Sangster says: "Many young women belittle their employment by going to it in the spirit of martyrs, who pity themselves or by bringing to it merely a mercenary motive. Self pity is the badge of weakness and work done for money alone is never noble work. One must dignify the work for its own sake. One must care for the enterprise."

Whenever I find a paragraph like this, I save it for the Sunday service and after they have read it I sometimes ask them to give me in writing their opinions on the subject. I also drill them on the rules this way and they enjoy it very much. They get a wider view of the word discipline and understand the strict observance of the rules is not enforced simply to be obeyed. The feeling of good will and contentment prevails through the office.

The management has the hearty co-operation of every operator in its employ, as its policy has always been to make the conditions such that perfect harmony should prevail. Operators are given thoroughly to understand that they are under the supervision of the chief operator and assistants in the dressing room as well as in the operating room. While we expect them to attend strictly to business in the operating room, they are not permitted to talk shop or speak in a discontented manner among their co-workers. They may talk about their dresses, their engagements and their sweethearts as much as they desire. A hearty laugh and a smiling face in the dressing room are sure tokens of good work in the operating room. We all regard a troublesome operator as a piece of drift-wood that floats into our midst, scurrys around, misplaces things, then drifts out again—and is forgotten.

Many pleasant little outings are given by the company, such as an annual picnic, a hay rack ride, a theater party and a sleigh ride. They are the connecting links of the seasons and if you want to see a bright, happy set of young women come to Springfield, but I'll not promise you any wives. They are all under a five-year contract not to get married.

In Minnesota the other day a man was advised of the approach of a storm cloud by telephone. He had time to take his family to a nearby clump of willows and thus escape destruction, as the house was leveled. This clearly shows the efficacy of the telephone, but our idea of a western cyclone was that it was somewhat faster than the ordinary telephone service.

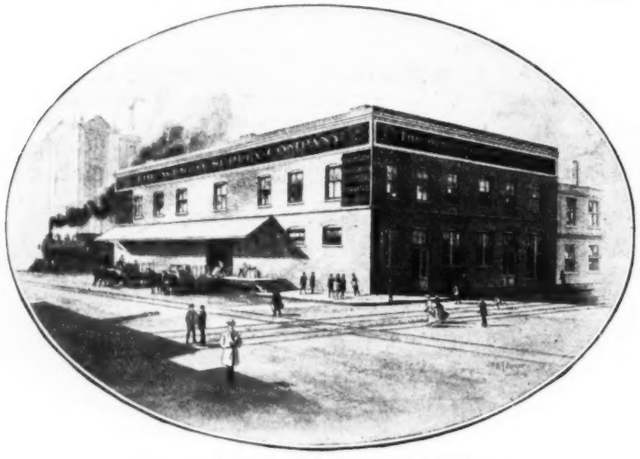
MANUFACTURERS DEPARTMENT

THE WESCO SUPPLY COMPANY.

Enterprising methods and an aggressive business policy, combined with able management, has enabled the Wesco Supply Company to reach its present position as one of the most successful electrical concerns in the west. The company was incorporated in August, 1903, when it acquired the business of the Western Electrical Supply Company, beginning operations under the present name the following month. In so far as they applied to the electric lighting, telephone and electric railway supply departments, the new company purchased the stock of merchandise, catalogues, leasehold and the good will of the Western Electrical Supply Company, and has since extended its operations with marked success.

General Offices and Main Warehouse, Wesco Supply Company, St. Louis, Mo.

The Wesco Supply Company furnished the St. Louis World's Fair a large amount of the supplies and apparatus used at the big exposition by the exhibitors, the concessionaires, and the official management of the fair. Since then the company reports that its business has increased so rapidly that the organization has enlarged, and various departments established, so that all branches of the trade will receive efficient and prompt attention. In conformance with the improved plan, the Wesco organization has been perfected as follows: C. R. Scudder, president; R. V. Scudder, vice-president and general manager; A. M. Wood, treasurer; Chas. Scudder, Jr., manager country sales department; W. W. Moore, manager apparatus and specialty department; H. P. Didriksen, manager telephone department and advertising; D. L. Monjo, manager street railway and mining department; J. D. Raymond, manager lighting supply department; F. B. Phillips, manager city sales department; W. L. Moase, purchasing agent; H. W. Becker, superintendent operating department.



Wesco Fort Worth, Texas, Warehouse.

Mr. R. V. Scudder has been actively engaged in the electrical supply business since 1877, and organized the Western Electrical Supply Company in 1891. Mr. Didriksen, manager of the telephone department and advertising, obtained his training in Chicago, and joined the Wesco company in 1905. Mr. Phillips was for several years general manager of the American Electrical Supply Company of Chicago. Every man on the official staff is experienced in the business, and has a thorough knowledge of his department, which fits each for the special work assigned him. In addition the company has a branch warehouse at Ft. Worth,

Tex., where a complete stock is carried. The Wesco Supply Company has a large corps of traveling men who cover every western and southern state. Besides the large store at Seventh and Clark avenue, St. Louis, the company maintains headquarters in a large warehouse on Eighth street between Clark avenue and Spruce street. In these headquarters, together with its Ft. Worth house, the company

Branch Wesco Warehouse, St. Louis, Mo.

carries one of the largest supplies of electrical goods of every description west of the Mississippi river.

NEW FIRM IN THE FIELD.

Chicago has recently added to its list of electrical supply houses a new one, which on account of the personnel of the company is exciting more than ordinary interest among Independent buyers throughout the country. This company, which is styled the Durant Electric Supplies Company, is a corporation organized under the laws of the state of Illinois and has its headquarters at 77 Jackson boulevard.

The Durant Electric Supplies Company has entered the field with the purpose of giving special attention to telephone supplies and construction materials for Independent companies, and its facilities for handling all business of this sort are as complete as modern business methods can make them. Their motto is "Get business and take care of it right," and those who are acquainted with the young men at the head of this company will know that this motto will always be religiously enforced.

The company needs an introduction to the telephone trade in name only, for all its members are well known to the Independent field, having been actively identified with it for a number of years past. Mr. H. S. Durant, president and manager of the company, began his career in the telephone business a number of years ago in the shipping department of the Stromberg-Carlson Telephone Manufacturing Company. After graduation from the University of Michigan he entered the employ of the Automatic Electric Company as buyer, shortly afterwards joining the sales force of the same company and being one of the first men sent out to exploit the automatic system. Just previous to the organization of the Durant Electric Supplies Company he was a member of the firm of Geo. W. Conover & Comapny of this city, well known as purchasing and forwarding agents for Independent telephone companies. In May of this year he took over this entire business, buying out his partner's interest and using the old concern as a nucleus for the organization of this newer and larger company. Mr. Durant enjoys a wide acquaintance among telephone men, and his record has been a creditable one throughout, his energies, from the very beginning, having been enlisted with the Independent companies.

Mr. J. F. Crook, vice-president of the company, is, perhaps, as well known to the field as any young man in the business, and his identification with this new enterprise will not only lend it considerable strength, but give it an endorsement which will be strongly felt. Mr. Crook is another ex-member of the Automatic Electric Company's selling staff, having been identified with this company for over four years.

Mr. F. W. Pardee, treasurer of the company, needs no introduction. As manager of the Frank B. Cook Company he is known to nearly everyone in the business. His connection with this new company, though not in an active capacity—since he will continue his connection with Frank B. Cook—is a guaranty of its success.

Mr. E. E. Dewey, the secretary, has been identified for a number of years with the electrical business, and as secretary of the American School of Correspondence is well known to engineers throughout the country.

The new company, therefore, is in the hands of men whose acquaintance with the trade and knowledge of the telephone business speak well for the success of the enterprise. They have entered the field, believing there was need of an institution such as they have established—that is, one that makes a specialty of telephone construction materials—and with their experience as practical telephone men there is little doubt that they will succeed.

H. S. Durant.

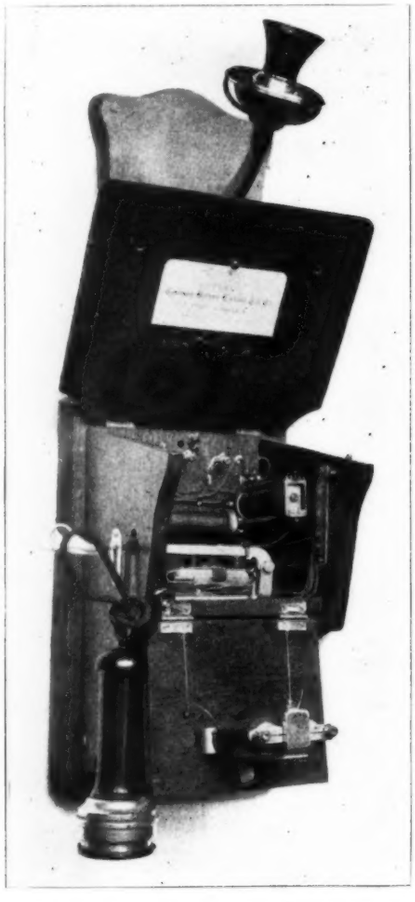
TELEPHONE PINS AND BRACKETS.

J. B. Galloway & Co., Clarendon, Ark., manufacture standard insulator pins and brackets, making a specialty of oak and locust. This firm is located on the White river and barges all its oak and locust for that purpose, going as far as 150 miles up and down the river from Clarendon for its locust supply. This class of timber is very scattering and hard to assemble in paying quantities, hence

the necessity for equipping with barges, steamboats and derricks on river and bank for logging same. Galloway & Company run four lathes, four band saws, one self-feed ripping machine, and one four-sided moulder, as well as boring, splitting and equalizing machines, in getting out this material. The firm's capacity in pins and brackets is 15,000 pieces per day, or one carload per week. Later on it will be in position to make all kinds of special pins and brackets, from three inches in length up to and including thirty inches. Some customers require special pins with a hole bored through from end to end, and Galloway & Company are also in a position to furnish this class of goods. Inquiries and orders will receive prompt attention.

A NEW LOCK-OUT.

A positive central energy lock-out, requiring no additional central office equipment and that does not in the least affect the efficiency of the talking circuit has been put on the market. It is completely enclosed in the instrument cabinet and is easily applied to instruments already in use. A high



Peru Common Battery Lockout Telephone.

wound relay does the work and no impedance is necessary either in series with or bridging any part of the talking circuit.

Referring to the drawing the operation is as follows:

B is the central office battery, grounded at *G*. *I-I* represents impedance, in the form of a relay, repeating coil or retardation coil, supplying current to the line wires *L-L'*.

Suppose a voltmeter be attached from line *L-L"* to ground, the reading would, of course, be the voltage of battery *B*. Now, with all receivers on their hooks, change the voltmeter to line wire *L-L' "*. There being no source of potential between the ground *G* and the voltmeter, the reading is zero.

Leaving the voltmeter in this position, lift the receiver from a telephone on the line, thus, connecting line *L-L"* carrying the battery voltage with line *L'-L" '* which previously carried no voltage. This change in voltage is taken advantage of to operate the locking magnets *R* and *R'* of the telephones *M* and *N*.

On removing receiver from hook of station *M*, the circuit is established from line wire *L* to post *3*, thence over wire *4* through the induction coil and transmitter to contact *C* (which is closed by the releasing of the armature of relay by spring *F*, attached to hook H) wire *5*, normally closed contact *K*, contact *S*, wire *6*, post *1* to wire *L'*, a portion of the current taking wire *L' "* to post *1'*, wire *7*, winding *R* wire *8'*-post *2'* to ground *G"*, thus energizing relay *R'*.

Now, should an attempt be made to use station *N*, the hook *H* will rise, the spring *F* will disengage the armature, but the armature remains in the closed position, and through the insulated rod *J* holds contact *C* open, which, of course, makes station *M* inoperative.

However, should station *M* wish to call any other station *N*, he gives the operator the number in the usual way. The operator instructs him to "press button until party answers," opening contact *K*, bridged by condenser *X*, thus cutting all current off line wire *L'L' "*, and de-energizing relay *R'*. The operator rings station *N*, and, upon answering, is

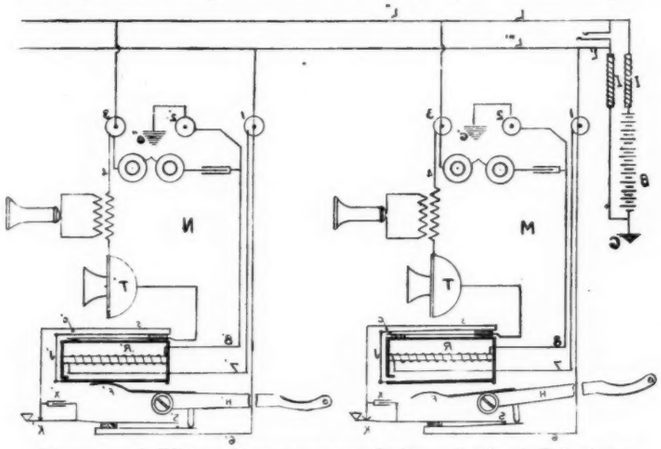


Diagram of Wiring Peru Common Battery Lockout Telephone.

heard by the party at station *M*, through condenser *X*. Station *M* now releases the push button, closing contact *K*, thus completing a perfect talking circuit between the two stations. Should station *N* not answer on the first call, the operator will continue to ring, having complete supervision, the supervisory lamp lighting when contact *K* is opened and remaining lighted until party called answers.

The relay being wound with as large wire as possible on a heavy core to a resistance of 1,600 ohms, and having a completely closed magnetic circuit, the impedance is very high, offering practically no path to the voice currents, which should ply strictly on the metallic circuit.

No amount of jarring will release a locked instrument and no safety device is needed to prevent such release, nor to insure that it remains in its proper position.

The complete instrument is shown in the accompanying illustration.

The device is being put on the market by the Peru Common Battery Lock-out Telephone Company, Peru, Indiana.

William A. Wadsworth, advertising manager for the Inter-Ocean Telephone Company, of Buffalo, is the proud father of a ten-pound boy. The new arrival is reported "100 per cent good."

TRADE NOTES.

THE OLIVER MANUFACTURING COMPANY, Philadelphia, is preparing to bring out a new and improved type of its very successful equipoise telephone holder.

THE SWEDISH-AMERICAN TELEPHONE COMPANY, Chicago, recently installed a telegraph office in its factory to accommodate increasing business and expedite work. The Swedish-American believes in doing things promptly.

GREETING to the progressive telephone manager is contained in the Edwards-Hine Co. (Grand Rapids, Mich.) latest circular, which explains its system of office accounting and filing. The firm has a new plan of telephone systematizing.

THE NATIONAL TELEPHONE SUPPLY COMPANY, Cleveland, O., has issued a folder advertising Marlin cable hangers, non-breakable messenger hangers, three-bolt guy-clamps, pole protection strips, Blackburn ground clamps and wire connectors.

THE JULY KIRK'S BLOTTER, issued by McCroy Clay Works, Brazil, Ind., manufacturers of McCroy conduits, contains a copy of the immortal "Casey at the Bat." The trade will appreciate the selection just now while the baseball season is at its height.

THE PLANT of the Cruver Manufacturing Company, 464 Carroll avenue, Chicago, was visited, June 28, by a disastrous fire, in which two persons were killed. The Cruver Manufacturing Company makes a great deal of celluloid flat work, souvenirs, badges, etc., for telephone companies.

THE JOHNSON ELECTRICAL MANUFACTURING COMPANY, Room 410, 26 Van Buren street, Chicago, has just issued a technical description of the Noble central energy lockout, which contains much matter of value to telephone men, whether interested in telephone lockouts or not. It will be sent free upon request.

AN INTERESTING PAMPHLET describing the automatic system has been issued by The American Automatic Telephone Company, Rochester, N. Y. The booklet contains illustrations and complete descriptions of switches, substation selectors, metered service, fire alarm, district messenger and police service, and explains their working.

THE GRAY TELEPHONE PAY STATION COMPANY of Hartford, Conn., has recently installed 1,600 Gray new style self contained pay stations in John Wanamaker's new store in Philadelphia. This is the largest installation of pay stations in any store in the world and the Gray company is to be congratulated on landing this important contract.

THE FARR TELEPHONE AND CONSTRUCTION SUPPLY COMPANY'S catalogue No. 19 for 1906 is out, stating prices for the telephones, switchboards, construction material and electrical specialties manufactured and handled by that concern. Correspondence is solicited, and all inquirers will be furnished any information desired. The company's address is Chicago.

THE CENTURY TELEPHONE CONSTRUCTION COMPANY, of Buffalo, N. Y., has recently made an extension to the switchboard of the Ithaca Telephone Company, Ithaca, N. Y., of four positions, common battery. The company is installing a complete common battery equipment at Attica and Friendship, N. Y., and has recently completed the installation of a common battery, four party, selective board at East Aurora, N. Y.

THE SEMI-MONTHLY stock sheet and price list of the Commercial Electrical Supply Company of St. Louis deals with the prices of rubber and lead covered wires and cables. It will be forwarded on application. The company also sends out a handsome folder "introducing our Mr. Net Price." The Swisher Marline cable hanger, Moon junction and splicing box and metal furniture for the operating room are features of this issue.

THE CENTRAL ELECTRIC COMPANY of Chicago is sending out a unique blotter on Okonite printed in two colors, which is causing favorable comment amongst the trade. It reads as follows: "By using this blotter on an order for Okonite you are entitled to a life membership in the society of satisfied users, composed exclusively of those who use and endorse Okonite as the standard for rubber insulation." It is suggested that any one desiring to become a member of the "Society of satisfied users" write the Central Electric Company for one of these blotters.

THE FAHNESTOCK ELECTRIC COMPANY, 129 Patchen avenue, Brooklyn, N. Y., reports a very marked increase in the sales of its spring binding post. Telephone buyers are requested to specify that all their equipment be fitted out with the Fahnestock spring binding posts as far as possible. It is coming into general use on dry batteries, test sets, receiver cord tip connections, operator's transmitter cord connections, battery and ringing lead connections, lightning arrestors, and in fact for any purpose where an old style binding post was formerly employed. Descriptive matter will be sent to all interested parties on request.

ESTABLISHMENT OF A MANUFACTURING PLANT has been begun for the American Telegraphone Company at Wheeling, W. Va. The financiering of this undertaking is in the hands of Charles K. Fankhauser & Company and the Sterling Debenture Corporation of New York City. Since the first announcement of Poulsen's invention of the electromagnetic "recording and speaking telephone," a corps of American experts have been working on the perfection of the instrument for commercial purposes. This is now said to have been accomplished, and the company expects to be in a position to meet the demand for telegraphones which is at present far ahead of the supply.

BULLETIN NO. 12 OF THE DEAN ELECTRIC COMPANY, Elyria, O., is at hand, and contains much interesting information concerning the common battery telephones and circuits, Dean transmitter, metal box, business and residence, and harmonic selective ringing telephones. The company advances the theory that the trend of modern telephony is toward the simplification of the subscriber's telephone apparatus and reducing the cost of maintenance to the minimum, and claims that the nearest approach to this perfection is found in the common battery type of telephone manufactured by the Dean Electric Company. The company calls special attention to its portable desk telephone.

THE WESCO SUPPLY COMPANY, of St. Louis, Mo., is distributing a very complete net price list in booklet form covering its line of magneto and central energy telephones, also

prices on lineman's tools, construction material, exchange equipment and supplies. The cover of this booklet is unique and very attractive being a reproduction of the emblem of the St. Louis Million Club, which is the equestrian statute of St. Louis bearing a shield. The Wesco Supply Company has taken advantage of this opportunity to call attention to its trademark by compelling St. Louis to bear the Red Shield, at the same time displaying the motto phrase "To the Front," as emblematic of the spirit of the Wesco Supply Company, as well as of St. Louis.

THE SWEDISH-AMERICAN TELEPHONE COMPANY, Chicago, whose advertisement is shown in this issue, has recently contracted with the companies below named for their complete equipment, central office apparatus and telephones: Farmers' Co-operative Telephone Company, Diller, Neb.; Charlotte Telephone Company, Butler, Mo.; Bureau County Telephone Company, Kasbeer, Ill.; Kinney Telephone Company, Marion, Mich.; Burritt & Winnebago Telephone Company, Winnebago, Ill.; Turley Telephone Company, Ona, W. Va.; Murphy Mutual Telephone Company, Murphy, Iowa. The company also announces that it has opened a branch office in Toledo, Ohio. The affairs of the company at this point are in charge of Mr. J. A. Russell, who is well and favorably known to the telephone field. The offices are located in the Spitzer building, rooms 1024-1026. The Swedish-American Company is enjoying a large business in territory adjacent to Toledo.

THE CADIZ ELECTRIC COMPANY, Cadiz, Ohio, is now operating a pin department, manufacturing locust pins and oak brackets. The company is fortunate in being located in a part of the country where locust is abundant. The logs are assembled at the plant, where they are sawed into plank, the plank ripped into strips, and the strips cut to the required length of the pin to be produced. Automatic turning lathes do the rest. The factory is now operating on a basis of 7,000 pins per day; but it is being equipped so that 12,000 pins per day will be the maximum output. In connection with the locust pin industry, equipment has been installed to manufacture 3,000 oak brackets per day. The installing of band saws, ripping machines and lathes has not interfered with the steady advancement of the telephone department, which is enjoying great prosperity. We are advised by the management that the pin product is nearly all consumed by local operating companies.

TOPEKA CONTRACT AWARDED.

The American Electric Telephone Company, Englewood, Chicago, has just secured one of the most important contracts of the year, the Topeka Independent Telephone Company, Topeka, Kan., awarding it the contract for building a new 10,000 line, multiple, lamp signal, central energy switchboard. The Topeka company intends to operate a great many partly lines, and for that reason the number of lines per operator's position is reduced to 100. Each position is also equipped with fifteen sets of cord circuits, each including the American company's four-party selective key, permitting the operation of its well-known high and low frequency selective system of telephones.

In addition to furnishing the main exchange switchboard, which has a present installation of thirty-nine positions, the contract includes a two-position chief operator's desk; a two-position information and trouble clerk's desk; one two-position toll recording desk, which is required to operate in conjunction with the four-section toll line American switchboard already installed.

The terminal room equipment consists of an intermediate and main cross-connecting board, protector rack, using the American company's combined carbon and sneak current arrestor. This, together with the relay rack, cable rack, etc., making a very complete equipment.

The power plant consists of a four-panel power and fuse board, together with the necessary ringing and charging machinery. One of the charging machines is driven by an outside source of electric power, while the remaining charging machine is driven by a gas engine.

The contract for the Topeka equipment was awarded to the American company after a very spirited contest, and a significant fact in connection with the awarding of the contract is that the present Topeka common battery type switch board, which is still in operation and giving good service, was built by the American company in 1900. The circuits adopted for the new switchboard are substantially the same as those contained in the old switchboard, and the fact that the Topeka company's engineers adopted the same circuit which has operated for years would seem to justify the American company's claims that its common battery switchboard system requires the least expense in maintenance and operation.

The system referred to is the American company's type in which there are only two relays in the entire cord circuit, and one relay in the line circuit, making what is claimed to be the only single relay, single contact common battery system in existence.

ROBINSON POLE DISTRIBUTION RACK.

Compared with the old style ring or circle top for running subscriber's drop out from a pole, the Robinson pole distribution rack is claimed to be as far superior as the present era is to that preceding the advent of the telephone.

Robinson Pole Distributing Rack.

Simplicity and practicability are the essential features of the Robinson rack, combined with a greatly reduced cost. In the old style pole ring distribution a great item of waste was encountered if the leads all led in one direction. Then the insulators on one side of the ring were practically worthless.

With the Robinson distribution rack all drops can be easily handled by placing the rack on the side desired or one on either side as the occasion demands. For example, twenty drops equally divided, one ten pair rack would be placed on each side of the pole. In case the twenty drops were all on one side, a twenty pair rack would be placed on that side of the pole.

Another advantage possessed by this rack is that it can be extended to accommodate any number of insulators required. As for instance, in the cut shown of a ten pair rack, if it were desired to use fifteen leads, another row of five insulators could be inserted in the middle; or if twenty drops were needed, the stands could be lengthened to accommodate ten insulators on each side.

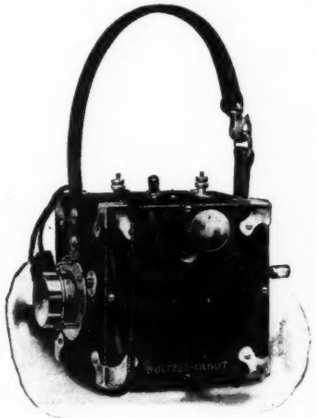
A recent improvement that will appeal to the construction man is the manner of fastening the rack to the pole. The upper and lower pieces are heavy, well braced malleable iron castings of great strength, with convexed surfaces. This

makes it unnecessary to gain the pole, as the casting conforms to the outline of the wood, and this also tends to lengthen the life of the pole, as no inner surface is exposed by cutting. In case of lengthening or shortening the rack no blaze is left open to the action of the weather.

Further information regarding this rack can be obtained by writing the W. G. Nagel Electric Company, Toledo, O.

NEW LINEMAN'S TESTING SET.

The Holtzer-Cabot Electric Company, of Brookline, Mass., and Chicago, Ill., is placing upon the market a "Receiver Type" of lineman's testing set. This form of testing set has been very popular with linemen, and it is anticipated that this set will be more so on account of several practical improvements that are embodied in it, one of which is the feature of the push button in the receiver. A push button is placed on the side of the receiver, which can be operated by the finger when the receiver is held to the ear. This push button, as it normally stands, has the receiver circuit open, but by pressing on the button the circuit is closed; therefore, when any one desires to talk into the receiver or receive a communication, the button is held closed by the finger and when the conversation is through the receiver may be laid down, and the receiver circuit is automatically opened. If the receiver circuit was left across the line, as is ordinarily the case, there would be two bad features:



New Lineman's Testing Set.

First, when a current comes over the line for ringing purposes most of the current would be short circuited through the receiver on account of its low resistance and the bell would hardly operate sufficiently loud for calling purposes.

Second, when an alternating-ringing circuit is received through a receiver, it tends to demagnetize the permanent magnets in the receiver and thereby renders it useless. In other forms of testing sets a two point switch is usually depended upon to open the circuit of the receiver, or the lineman is supposed to unfasten one side of the receiver circuit from the binding post. Such a form of construction, however, is not right, due to the fact that the lineman often forgets to open up the circuit with the switch, or to take one side of the receiver line out from the binding post; therefore the push button in the receiver of this set is a distinct improvement.

Other points of advantage in this set are as follows:

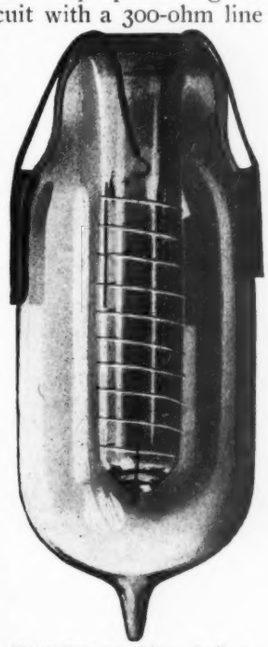
The carrying strap is furnished with a clasp, so that the box may be quickly fastened around a cross-arm or suspended from any projection.

The generator is equipped with a combination spring, which gives either pulsating or alternating current at will. A two point switch is located on the top of the box, so that the lineman can use either straight alternating or pulsating current as he chooses. The ringer is of 1,000 ohm resistance and normally stands directly across the line. There is, however, a push button in the circuit, so that, if desired, the ringer may be shunted out and the full strength of the generator given to the line for high resistance testing purposes. The company has combined in this set a piece of testing apparatus that covers every field required by the lineman. It can be used for either series or bridging work.

The set is put up in a substantial box; the workmanship is of the same high standard as maintained by this company on all its apparatus, and it has been gotten up and designed with care to meet all the requirements of linemen in their difficult task of testing. The company anticipates an extensive demand for this set.

THE VOTE-BERGER BALLASTED SWITCHBOARD.

The Vote-Berger Company, La Crosse, Wis., has recently brought out a line ballast device which obviates the use of relays. By use of the iron wire ballasted circuit, the Vote-Berger Company says it is able to put on the market a switchboard in which the line lamp is placed directly in series with battery, subscriber's line and a protecting iron wire ballast. The function of the iron wire ballast is, of course, to protect the lamp from an over-voltage. For a private branch exchange the resistance of this ballast on a line of 300 ohms resistance will be approximately 20 ohms. The lamp used in conjunction with it is of proper voltage to show its full brilliancy when in circuit with a 300-ohm line ballast and exchange battery. With a line of zero resistance, the increased current passing through the ballast instantly increases its resistance to approximately 240 ohms. This increased resistance is to replace the line resistance found in the longer lines. The line lamp, being in series will get approximately the same voltage across its terminals that it had in the case of the long line. In other words, the ballast acts as a self-adjusting resistance to maintain a constant potential across the lamp terminals.


Vote-Berger Line Ballast.

These ballasts, the Vote-Berger Company claims, will burn steadily on a maximum voltage for over 500 hours so that their life in switchboard use is practically infinite.

The cord circuit is such that the supervisory lamp will give a signal when the subscriber hangs up his telephone, and will remain dark while the subscriber is talking. No relay is used to accomplish this, so that with the exception of one low wound relay, operating the pilot lamp and night bell, the V-B common battery switchboard contains absolutely no relays.

An enormous advantage is claimed by doing away with the relay. A relay is said to be a constant source of trouble, because: First, the contact is liable to be dirty and prevent the lamp from lighting. Second, the relay is certain to get out of adjustment more or less frequently. Third, the relay winding being on the line, is peculiarly subject to injury from lightning or other static discharges. Fourth, the relay is necessarily heavy and makes the switchboard heavy and awkward, and hence liable to damage in shipment. Fifth, which is one of the main objections on the part of the purchaser, the relay is an expensive proposition and a relay board cannot be sold, it is said, by the Vote-Berger Company, in competition with a Vote-Berger ballasted board.

The ballast is very light and small, hence it is mounted in the top of the switchboard, and adds practically no weight to the board.

The Vote-Berger common battery switchboard is one containing absolutely no moving parts to get out of adjustment and no contacts whatever except where the plug registers with the jack.

The board is designed to be used either with storage cells or with dry batteries, and as in case of dry battery supply

the battery consumption is an important factor, the board is so wired that no battery is flowing unless plug is inserted in a line jack or a key is thrown in a listening position. No battery is flowing through the operator's transmitter unless one of the keys is thrown in a listening position.

WATER-TIGHT TELEPHONE SYSTEM.

The following description and illustrations relate to the special telephone system designed and built by the Holtzer-Cabot Electric Company, Boston, Mass., and Chicago, Ill., for the naval department of the United States government. Five similar systems were purchased by the government and installed upon the following battleships: "California," "South Dakota," "Milwaukee," "Indiana" and "Connecticut". To meet the especially severe conditions which obtain on shipboard there were incorporated a number of novel and original features.

It was especially desired that the instruments be unaffected by the action of the air, the movement of the vessel, or the concussion of heavy guns, and the switchboard and exposed stations were to be absolutely water-tight.

Figure 1 represents one of the water-tight stations. The operating parts are mounted on a frame plate which can readily be removed from the case without the use of tools and without disturbing any of the connections. One of the distinctive and original features of this station is the double receiver, the two receivers operating indepeadently of each other so that either or both may be used. The act of raising one of them to the ear brings the transmitter into the proper position for talking and signals the switchboard. When released all parts return to their normal condition, making it impossible for any user to leave the telephone connected to the line. The receivers are of the watchcase type, double pole, with metal cases, the coils being specially treated to make them waterproof. The transmitters are of the solid back type, the chamber being hermetically sealed, and there is nothing used that will be affected by the moisture. The arms will support a weight of 200 pounds. The case which encloses the station is of composition, polished and oxidized and provided with a channel into which is

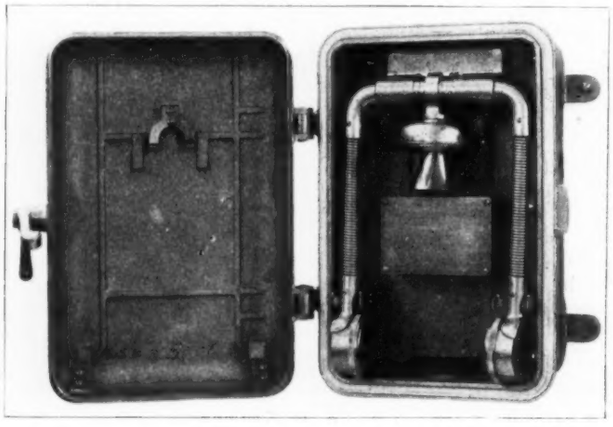


Figure 1.

fitted a molded gasket of pure rubber. The non-water-tight stations are interchengeable with the water-tight telephones, the operative parts being mounted upon a mahogany base instead of in a metallic case.

With each station there is furnished a separate water-tight vibrating call bell. The design of the mechanism of this bell is distinctly special, the blow being delivered to the gong through a phosphor bronze diaphragm, which is reenforced so that there is no danger of its being worn by use. The parts of the bell are made of non-oxidizable metal, with the exception of the iron and steel parts, which are copper plated and lacquered to prevent corrosion.

The operative parts of the switchboard are mounted in a heavy brass case, shown in Figure 2. This is gasketed so that when the cover is closed it is absolutely water-tight. The case is divided into two compartments, the upper containing the terminals and the lower the switchboard proper. The upper part of the case is drilled for 2-inch conduits. The terminals are of heavy copper lugs and are insulated with mica. A distinguishing feature of the board is that the connections are made without cords, there being used specially designed keys instead. The front of the switchboard is subdivided into vertical strips, each holding four keys. By tak-

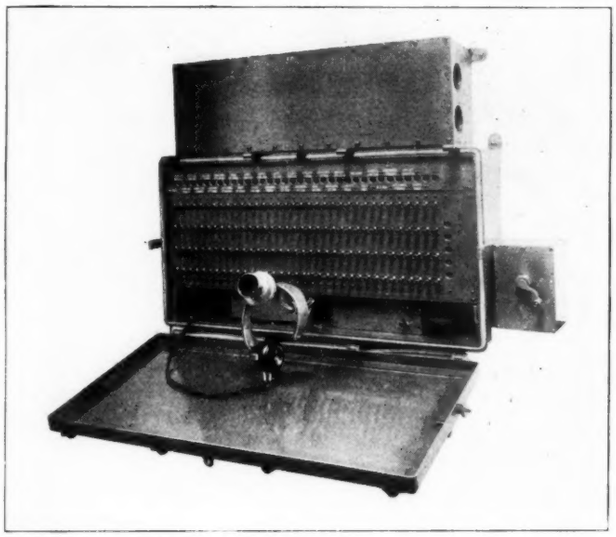


Figure 2.

ing out two screws any one of these strips may be removed, exposing for examination every contact and connection on the strip. The whole front, which supports the case and signals, is hinged at the bottom so that it may be readily let down, allowing the cables to be examined. A supervisory signal is provided with each connecting circuit, the purpose of which is to indicate when the conversation has been finished.

Provision is made for connection with shore exchanges, the signaling current being obtained from a hand-power generator, which is held in the box shown at the right of the cut. The system will work in connection with either a common battery or magneto exchange.

Current for the transmitters is taken from a Holtzer-Cabot motor generator of the noiseless type. These circuits draw their current directly from the motor generator, there being no storage batteries. The ringing current is obtained from the ship's ringing dynamotor, or, in case of disability, from an emergency set of dry batteries. The system operates on a three-wire circuit, and five conversations can take place at the same time, or any number of stations can be connected and an order transmitted simultaneously to them from any other station.

The system as a whole has been built with a special view to ruggedness, so that nothing short of actual violence can cause injury.

GLOVES FOR ELECTRICAL WORK.

Telephone linemen and electrical workers generally will be glad to learn that there is a prominent concern, centrally located, which makes a specialty of gloves peculiarly adapted to their needs. The concern referred to is the Chicago Glove & Mitten Co., of 170 North Halsted street, Chicago, Ill. A neat catalogue is issued by this house, in which is shown the different styles of gloves and mittens suitable for linemen, motormen, engineers and anyone who wants a

good easy, well-fitting glove or mitten and one that will stand hard wear. The Chicago Glove & Mitten Co. states that in manufacturing its gloves and mittens it uses the best of materials. Its Indian tanned buckskin is said to be the strongest and best wearing leather on the market. Its calfskin and horse hide gloves are tanned to stand the effects of steam and water. This leather will not shrink or harden.

In case customers lose one glove the manufacturers will make a mate for the one left at one-half the price per pair.

Samples of leather will be furnished upon request.

IT PAYS TO EXHIBIT AT CONVENTIONS.

This is the expressed belief of The United States Coin Register Company, of Toledo, Ohio. "The results have more than paid us," says this company, "and we are pleased to learn that the operating companies value the recording feature so highly.

"A record is necessary if you wish to systematize the collection of your pay stations, and so important is the system applied to pay stations, that the United States Coin Register Company received much praise.

"The original consecutively numbered tape is the only accurate recording system that cannot go wrong or be cheated, as it issues a part of this tape into the money box, which is an absolutely correct amount of the money at the time every collection is made.

"This original record must be taken with the money to the auditor, and, if altered in any way, the alteration will be detected at once, being positive proof against theft or tampering. It prevents a collector from making a record to suit his own desire, and you do not need to employ an inspector or detective to follow every collector. The United States coin register is also the pioneer in the use of only one tone, or gong, to notify the operator, in order to overcome the confusion of sounds. The number of times the gong strikes tells the amount of each deposit.

"The United States coin register strikes the gong once for a 5-cent deposit, twice for a 10-cent deposit and five times for a 25-cent deposit.

"It will pay everyone to fully investigate the merits of the combined cash register and pay station."

"THE MICHIGAN FARMER'S TELEPHONE."

The Michigan Electric Specialty Co. of Muskegon, Mich., has been very successful this season with its "Michigan" party line telephone, especially adapted to farmers' lines. Ever since this popular device was first brought out its sales have been on the steady increase, due no doubt to the very great demand for reliable apparatus of this character and also to the fact that the Michigan farmer telephone is said to fill a want not met by any other instrument. It also is claimed by the manufacturers that, ou of the hundreds now in use amongst many of the leading companies of the country, all have proven uniformly successful and reliable dividend earners.

The Ohio State Telephone Association recently adopted the following report:

"For farm lines it is recommended that a divided circuit be used for ringing purposes. The telephone generator circuit should be arranged to give both pulsating and alternative current, thus making it possible for any subscriber to signal central and not ring the other party line bells, or to ring another subscriber on the same line without calling the exchange."

The Michigan farmer telephone is said to meet all of these requirements and more.

Under date of July 12, the News-Republican of Kenton, O., says: "The Kenton Telephone Company now has nearly 1,350 subscribers on the Kenton exchange, of which nearly 425 are farmers in the townships surrounding the city. This is the largest number of farmers on one exchange in the state of Ohio, and, as far as known, in the United States.

"One of the reasons for this fact is that the company believes that the farm telephone has come to stay, that it is one of the important factors which is causing greater prosperity to the farming community than has ever been known before, and that the sooner it is developed the better for all concerned. They are therefore pushing the building of the territory.

"The type of apparatus used on the farm lines is that recommended some time ago by the committee on standardization of equipment of the Ohio Independent Telephone Association and formally adopted by that body. There are a few of the old unsatisfactory styles still in use, but these are being retired as rapidly as can be consistently done, and the latter type installed in their place. A marked improvement in the service is the immediat result when such is done.

"Another factor which has aided rapid development is that the company's farm rates and construction of lines is such that the farm service is very profitable."

The manufacturer states that the type of apparatus above referred to is the "Michigan Farmers' Telephone," which will be found more fully described in the advertisement of the Michigan Electric Specialty Company on another page of this month's TELEPHONY. All interested parties are invited to address the manufacturers for full particulars, prices, etc.

RECENT DEAN CONTRACTS.

Among the recent contracts for switchboards closed by the Dean Electric Company are the following: Bloomington, Ind.; Morrisville, Vt.; Fremont, O.; Springfield, Tenn.; Pottsville, Pa.; Farmersville, O.; Albany, N. Y.; White Water, Kas.; Convoy, O.; Schenectady, N. Y.; Berlin, Germany; Lima, O.; Indianapolis, Ind.; Amsterdam, N. Y.; Levis, P. Q., Can.; Breesport, N. Y.; Amherst, N. S.; Douglass, N. Y.; Everett, Wash.; Elyria, O.; Detroit, Mich.; Howard, Pa.; Sardinia, O.; Des Moines, Ia.; Tontogany, O.; Ravenna, N. Y.; Boughtonville, O.; Vandalia, Ill.; Hendrysburg, O.; Plymouth, N. C.; Wakemen, O.; Lexington, Mo.; Elkhorn, Wis.; Thompson, O.; Cowgill, Me.; Rantoul, Ill.; Chatham, N. B., Can.; Schenectady, N. Y.; Pikeville, Ky.; Saybrook, Ill.; Bowling Green, Ky.; Toledo, O.; Mendota, Ill.; Doylestown, O.; Sussex, N. B.; Cuyahoga Falls, O.; Riverside, N. Y.; N. Ridgeville, O.; Barneston, Neb.; Treadwell, N. Y.; Penfield, Ill.; Tippecanoe, O.; Ravenna, N. Y.; Massillon, O.; Salem, Iowa; Majestic Springs, O.; North Creek, N. Y.; Birmingham, O.; Greensburg, Pa.; New Weston, O.; Connellsville, Pa.; Penfield, Ill.; York, O.; Pesotum, Ill.; Pettysville, Ind.; Raymond, O.; Sackville, N. B., Can.; Mt. Orab, O.; Claypool, Ind.; River Styx, O.; Elmira, N. Y.; Lebago, Me.; Covington, O.; Madisonville, Ky.; Smock, Pa.; Toledo, O.; Parma, Mich.; Modac, Ind.; Cardington, O.

A CORRECTION.

Mr. A. C. Davis of Parkersburg, W. Va., sends TELEPHONY the following letter, which we are glad to publish:

The report of the International Independent Telephone Association has done West Virginia an injustice, and we desire you to make a correction of same in your next issue. Our state association comprises twenty-six companies, with an invested capital of $1,244,000.00 and gross receipts $674,166.00. The state association represents 28,108 telephones, 561 toll stations, 86 exchanges, and 16,400 miles of circuit. Five companies of this state, we might say, control it: The National Telephone Company of Wheeling, the Consolidated Telephone Company of Fairmont and the West Virginia Western Telephone Company of Parkersburg. These companies control the central and northern part of the state, while the Huntington Mutual Telephone Company of Huntington and the Charleston Home Telephone Company of Charleston control the southern part of the state.

PROGRESS OF THE MONTH

Compiled by H. A. Downey

NEW COMPANIES

MOLINE, Kans.—The Moline Telephone Company has been incorporated.

BARDWELL, Ky.—The Bardwell Telephone Company has been incorporated.

PAPILLION, Neb.—The Farmers' Mutual Telephone Company has been organized.

MAYFIELD, Mich.—The Flint River Telephone Company has been organized.

MUNDEN, Kan.—The Farmers' & Citizens' Telephone Company has been incorporated.

DOUGLAS, Kans.—The Mutual Telephone Company has been incorporated at this place.

AUGUSTA, Kan.—The Rose Hill and Augusta Telephone Company has been incorporated.

EVEREST, Kans.—The Everest Mutual Telephone Company has been incorporated at this place.

ST. JOHN, Kans.—The Albana Central Telephone Company has been incorporated at this place.

GILBERT, W. Va.—The Gilbert Telephone Company has been incorporated with a capital stock of $500.

AMBOY, Ind.—The Cedar Line Telephone Company has been incorporated with a capital stock of $1,000.

HOWARD, Pa.—The Bald Eagle Telephone Company has been incorporated with a capital stock of $15,000.

TORONTO, Ont.—The Norton-System Telephone Company has been organized with a capital stock of $100,000.

DEERHEAD, Kans.—The Ranchman's Telephone Company has been incorporated with a capital stock of $4,000.

GRAND LEDGE, Mich.—The Grand Ledge Telephone Company has been incorporated with a capital stock of $10,000.

COLO, Ia.—Articles of incorporation have been filed by the New Albany Mutual Telephone Company, with a capital stock of $5,000.

TWINING, Mich.—The Arenac-Ogemaw and Losco Telephone Company has been incorporated at this place with a capital stock of $1,000.

HARRISBURG, Pa.—The Sugar Valley Telephone Company of Clinton County has been incorporated with a capital stock of $6,000.

FRANKFORT, Ky.—The Milburn Independent Telephone Company of Carlisle county has been incorporated, with a capital stock of $1,000.

COLUMBUS, O.—The Jesse T. Sheets Telephone Company has been incorporated with a capital stock of $10,000 by Jesse T. Sheets and others.

FORT TOWSON, I. T.—The R. B. Cheatham Telephone and Telegraph Company is being organized to construct and operate a telephone system.

FORT ATKINSON, Ia.—The Farmers' Mutual Telephone Company has been incorporated with a capital stock of $2,500 by C. D. Horton and others.

DOVER, Del.—The People's Home Telephone Company has been incorporated with a capital stock of $300,000. The incorporators are all of Chicago, Ill.

PECK, Idaho.—The business men and farmers of Peck and Orofino are organizing a company to construct an Independent telephone line between the two towns.

LINCOLN, Neb.—The Logan Telephone Company of Pierce County has filed articles of incorporation with the secretary of state. It has a capital stock of $680.

HOLDEN, Mo.—The Citizens' Telephone Company has been organized, with the following officers: President, M. C. Bell; secretary and treasurer, J. H. Zehr.

SARCOXIE, Mo.—The Sarcoxie Telephone Company has been incorporated with a capital stock of $5,000 by H. B. Boyd, Harry Bean, B. W. Alley, and others.

DALLAS, W. Va.—A farmers' telephone company has been formed with headquarters in Dallas, where connection will be made with a number of other farmers' lines.

ALEXANDRIA, La.—A movement is on foot to organize an Independent telephone company at this place with a capital stock of $50,000. The promoters will apply to the city council for a franchise.

DODGEVILLE, Wis.—The New Union Telephone Company has been incorporated with a capital stock of $50,000 by Orville Strong, D. H. Williams and J. P. Smelker.

WELLFLEET, Nebr.—The Wellfleet Telephone Association has filed articles of incorporation with the secretary of state. The capital stock of the company is $4,800.

LAMAR, Mo.—The Missouri Exchange Telephone Company has been organized with a capital stock of $10,000 by B. M. Guinney, S. F. Snodgry and Maybelle Guinney.

QUINCY, Ill.—The County Home Telephone Company has been incorporated with a capital stock of $2,500. The incorporators are F. S. Elliott, E. Best, James F. Barnett.

DELTA, Tex.—The Delta Telephone Company has been incorporated with a capital stock of $15,000. The incorporators are C. M. Reid, R. M. Connell, and R. M. Walker.

HOHENWALD, Tenn.—An Independent Telephone Company has been organized at this place with the following officers: President, C. D. Loveless; secretary, J. F. Whitwell.

CHADRON, Neb.—The Chadron Telephone Company has been incorporated with a capital stock of $12,000. The directors are J. T. May, A. W. Riekman, and L. E. May.

CHILLIWAC, B. C.—An Independent telephone company will be organized in this place. S. A. Cawley of Cawley & Paisley, this city, is among those interested in the project.

FAIRVIEW, Ore.—The Fairview Telephone Association has been incorporated with a capital stock of $1,000. The incorporators are T. G. Barker, A. E. Bettys and Frank Teters.

NEW ATHENS, Ill.—The New Athens and Hecker Telephone Association has been incorporated with a capital stock of $600 by John A. Barthel, Henry Schaeffer and Fred Schanz.

SHELBYVILLE, Ind.—A new Independent telephone company has been organized at this place with a view of competing with the company recently acquired by the Bell company.

LISLE, N. Y.—Articles of incorporation have been filed for the East Richford Telephone Company. It is the purpose of the company to construct a line from Lisle to Richfield.

BUFFALO SPRINGS, Colo.—The Buffalo Springs Telephone Company has been incorporated, with a capital stock of $2,000. The incorporators are: J. J. S. Harvey, J. V. Fleming.

COLLEGE STATION, Tex.—The College Telephone Company has been incorporated with a capital stock of $2,000. The incorporators are N. H. Brown, J. S. Wier, D. W. Spence.

LOGAN, Neb.—The Logan Telephone Company has filed articles of incorporation, with a capital stock of $680. It is the purpose of the company to operate a mutual telephone exchange.

LITCHFIELD, Minn.—The Strout Telephone Company has been organized and will construct a rural line which will connect with the Litchfield Telephone Exchange Company's system.

STELLA, Neb.—The Farmers' Mutual Telephone Company has been organized and the following officers elected: President, W. J. McCray; secretary, H. W. Lowe; treasurer, Morris Norris.

OLD FORT, O.—The Old Fort Mutual Telephone Company has been incorporated with a capital stock of $10,000 by R. G. Shannon, H. S. Fry, C. J. Fry, W. S. Beck, G. E. Zimmerman.

MAQUON, Ill.—The Maquon and Southwestern Telephone Company has been incorporated with a capital stock of $2,500. The incorporators are Asa Rambo, T. C. Grabill and C. D. Briggs.

PRESTON, Ia.—The Preston Telephone Company has been incorporated with a capital stock of $20,000. The officers of the company are as follows: President, John Maher; secretary, E. L. Cain.

MARATHON, Wis.—The Marathon City Telephone Company has been incorporated with a capital stock of $1,900. The incorporators are Nicholas Schmidt, J. G. Lang, Adam Muchea, and Arthur Akey.

ORLEANS, Ind.—The Irvine Telephone Company has been incorporated with a capital stock of $6,000. The incorporators are Reuben E. Chaltrand, W. H. Taggart, James W. Pickens and Aaron Speer.

LOVELL, Me.—The farmers of Sweden have formed a telephone company, to be known as the Sweden Telephone Company. It is the purpose of the company to construct a line from Waterford to Lovell, with an exchange at Lovell. The following officers have been elected: President, C. E. Jones; treasurer, Alvin Pike; direc-

tors, Daniel Holden, Edward Stone, Harry Bisbee and C. W. Bennett.

EDGEWOOD, Mo.—The citizens of this place recently held a meeting and decided to form an organization to be known as the Pike County Telephone Company to construct telephone lines in Pike county.

PAONIA, Colo.—The Grand Mesa Telephone Company has been incorporated with a capital stock of $5,000. The incorporators of the company are as follows: A. L. Binford, C. C. Hawkins, W. W. Follanshie.

HOLT, Mo.—The Clay County Telephone Company has been incorporated with a capital stock of $50,000. The incorporators are William H. Smith, John Eby, George W. Sexton, E. T. Hockaday, and others.

SWANTON, Neb.—The Swanton Mutual Telephone Company has been incorporated with a capital stock of $5,000 for the purpose of constructing and operating a telephone system in Swanton and surrounding country.

PLAINVILLE, Ill.—James F. Barnett, of Memphis, Mo., is interested in the formation of the Adams County Telephone Company. Mr. Barnett is in charge of the work of the Quincy Long Distance Telephone Company.

ST. PAUL, Minn.—The Cass county Mutual Telephone Company of Byron has been incorporated, with a capital stock of $10,000. The incorporators are F. W. Deline, J. O. Jesme, of Leader, and F. H. Clayton, of Esterly.

AGNES, Tex.—The Agnes Union Telephone Company has been incorporated, with a capital stock of $30,000. The incorporators of the company are: J. W. Moose, J. N. Frazier, of Agnes, and W. J. Sims, of Roberts, Texas.

BERKSHIRE, N. Y.—The East Berkshire Telephone Company has been incorporated with a capital stock of $2,000. The incorporators are Aaron J. Clufe and P. H. Beebe, Center Lisle, N. Y.; Oscar M. Austin, Berkshire, and others.

MOORLAND, Ia.—The Moorland Mutual Telephone Company has filed articles of incorporation, with a capital stock of $50,000. The officers are as follows: President, D. F. McCarville; secretary and general manager, F. C. Cochran.

NEEPAWA, Man.—An Independent telephone company is being organized at this place for the purpose of constructing rural lines which will connect with the local exchange. George R. Benton of this place is interested in the enterprise.

KENDRICK, Okla.—The Kendrick & Avery Telephone Company has been incorporated with a capital stock of $10,000 and the directors are Charles McClure, A. M. G. Hawse, J. C. Pringer, F. E. Galpin and S. O. Davis, all of Kendrick.

TROY, Ala.—The Orion Telephone Company has been organized to build a line from Troy to Orion, Pine Level and China Grove. W. C. Starke of Troy is president of the company and W. G. Cheney of Orion secretary and treasurer.

BRENHAM, Tex.—The Muellersville-Brenham Telephone Company has been incorporated with a capital stock of $600. The incorporators are W. F. Mueller of Muellersville, O. B. Lehman, Otto Zander, and Otto Loesch, all of Brenham.

RAINHAM, Ont.—The Erie Telephone Company has been incorporated with a capital stock of $10,000. The incorporators of the company are G. E. Dashner, A. Yager, S. Culver, E. Hoover, M. Kellam, B. Gee and F. Held, of Rainham.

HANLEY FALLS, Minn.—The Hanley Falls Telephone Company has been incorporated with a capital stock of $10,000. The incorporators of the company are I. Johnson, S. O. Aaberg, W. E. Hanson, H. M. Hanson, J. E. Lee, L. S. Orwall.

ALLIANCE, Neb.—The Ranch Telephone Company of Alliance has filed articles of incorporation with the secretary of state with a capital stock of $10,000. The incorporators of the company are William H. Hill, W. N. Campbell and others.

BLUE CREEK, O.—The Blue Creek Telephone Company of Adams county has been incorporated with a capital stock of $3,000. The incorporators are R. C. Jones, George S. Pile, F. E. Newman, O. E. McHenry, Albert Jones, and W. E. Warner.

RICHFORD, N. Y.—The East Richford Telephone Company has been incorporated with a capital stock of $1,000. The incorporators of the company are Aaron J. Clute, Center Lisle; Charles R. Finch, and Fred A. Ayers, Richford, N. Y., and others.

BERKSHIRE, N. Y.—A new telephone company has been organized with a capital stock of $5,000 to take the place of the one recently absorbed by the Bell company. A. E. Smith is president of the company and J. W. Brown secretary and treasurer.

BUTTE, Mont.—The Inter Mountain Construction Company of this city has been incorporated, with a capital stock of $100,000, to construct and maintain telephone and telegraph systems. The incorporators are: T. S. Lane, L. O. Evans, H. B. Brown.

OROFINO, Idaho.—The Farmers' Mutual Telephone Company has been organized at this place by the following: Fred Deiterle, Andrew Smith, and F. W. Powell. The company will build a telephone line from Orofino to Peck and from that point to Gilbert.

TOPEKA, Kan.—The Independent Telephone Construction Company of Topeka, with a capital stock of $10,000, has been granted a charter. This is a subsidiary company and will have charge of the extensive improvements which will be made by the company.

ROSSVILLE, Kans.—The Farmers' Mutual Telephone Company has been incorporated with a capital stock of $5,000. The directors are C. A. Taft and D. Kerr, Meeker, Okla.; W. G. Hall and T. A. Ward, Rossville, and L. J. Hardan, Midlothian, Okla.

MOORETON, N. D.—The Farmers' Telephone Company of Mooreton has been incorporated with a capital stock of $25,000. The incorporators of the company are Edward Wessel, W. F. Johnson, W. L. Ward, Methias J. Hafner, Jens C. Leimes, of Mooreton.

LOIS, Va.—The Lois Mutual Telephone Company has been incorporated with the following officers: President, J. M. Price; vice president, J. E. Stively, of Bealton, Va.; secretary and treasurer, George E. Bain; directors, R. W. Kemper, L. B. Anns.

NORTH LOUP, Neb.—The Loup Valley Independent Telephone Company Association has filed articles of incorporation with the secretary of state. The charter provides for $20,000 capitalization. The incorporators are C. E. White, John Roettger and others.

BEACH CITY, O.—The Beach City Home Telephone Company has been incorporated with a capital stock of $2,500. The incorporators of the company are Joseph F. Hay, M. W. Briggs, Otto E. Oberlin, J. M. Rumsey, A. B. Wingate and Jacob Muskopf.

BRAZIL, N. D.—The Brazil Telephone Company has been incorporated with a capital stock of $50,000. The incorporators of the company are C. W. Glasgow, C. L. Buckholder, Fred Rousig, C. J. Kennedy, Joseph Barr, A. B. Lose, Brazil; Tom Oksendale, Rugby, N. D.

RIPLEY, Me.—Certificate of organization has been filed with the secretary of state for the Ripley Telephone Company, with a capital stock of $1,000. The officers of the company are: President, W. H. Fanan; treasurer, C. S. Boynton; clerk, C. E. Tripp, all of Ripley.

AURORA, Ind.—The Southern Indiana Telephone Company has been incorporated with a capital stock of $10,000, to operate telephone lines in Dearborn, Ohio, and Ripley counties. The directors of the company are as follows: Frank B. Shutts and William H. O'Brien.

FULTON, Ky.—A new Independent telephone company, which will connect with all the rural lines in this section of the state, has been organized at Bardwell with the following officers: President, Jesse Nichols; directors, John G. Samuels, W. G. Ward and Dr. T. D. Bugg.

CINCINNATI, O.—The Fitzsimmons Independent Telephone Company will be incorporated with a capital stock of $100,000. Philip Fitzsimmons, formerly of the Fitzsimmons Manufacturing Company and other Cincinnati and Chicago capitalists are among the incorporators.

HONESDALE, Pa.—A number of farmers in this vicinity have organized a company to be known as the Wayne Telephone Company, with a capital stock of $5,000, and a charter has been applied for. W. H. Mumford is president and manager, and L. L. Mitchell, secretary.

REMSEN, Ia.—A number of farmers residing in this vicinity have organized a new telephone company and the construction of a line will begin as soon as possible. Among those interested are Albert Mensen, Chas. Rasberg, B. Huew, Jacob Pick, Detlef Lindeman and Jno. Schneider.

GUILFORD, N. Y.—The Unadella Valley Telephone Company has been incorporated, with a capital stock of $1,500. The incorporators of the company are as follows: A. C. Foote, Guilford, N. Y.; S. F. Benjamin, Rockwells Mills, N. Y.; George Cox, Mount Upton, N. Y., and others.

EVANSVILLE, Ind.—The Advance Telephone Company has been incorporated with a capital stock of $650 to operate a telephone line in Vanderburg county. The directors of the company are Henry Denzer, Henry Hartig, Charles Boeke, Fred Werkman, Christ Seipert, D. W. Farquhar and Henry Jung.

AUGUSTA, Me.—The North Dakota Independent Telephone Company has been incorporated, for the purpose of building and operating telephone lines. The capital stock is $8,000,000. The officers of the company are as follows: President, L. J. Coleman, Gardiner; treasurer, A. H. Macomber, Augusta.

MAZEPPA, Minn. A telephone company has been organized in South Mazeppa with the following officers: President, Chas. Marx; secretary, J. T. Hoffman; treasurer, W. H. Bright. It is the intention of the company to begin the construction of a rural telephone line as soon as material can be secured.

AUGUSTA, Me.—The Tri-State Telephone & Telegraph Company, with headquarters in Minneapolis, has been incorporated in Maine with western headquarters at Minneapolis. The capital stock is $2,000,000, of which $10,000 is represented by property and busi-

ness in Wisconsin. E. H. Moulton, Minneapolis, president; F. C. Nelson, secretary.

PITTSBURG, Pa.—Application will be made by the Philadelphia, Pittsburg & Erie Telephone Company for a charter for a new telephone system in Allegheny and other counties in the state. It is stated the company has no connection with either the Bell or the Pittsburg and Allegheny Telephone Company.

CHICAGO, Ill.—Articles of incorporation have been filed with the secretary of state for the Windsor and Richland Townships Mutual Telephone Company, with headquarters at Prairie Schoolhouse, Shelby county, with a capital stock of $2,400. The incorporators are S. Duncan, A. E. Walker and W. A. Fling.

ENTERLINE, Pa.—The Enterline-Halifax Telephone and Telegraph Company has been incorporated with a capital stock of $5,000. The directors of the company are W. H. Miller, E. A. Shupp, Fisherville; Carson C. Enders, C. H. Harman, Enderline, and B. Hoffman, A. M. Smith and L. T. Lebo, Halifax.

COLUMBUS, O.—Articles of incorporation have been filed for the Kelley's Island Telephone Company, with a capital stock of $10,000. The company will construct and operate a telephone system at Kelly's Island. The incorporators are Norman C. Upp, Frank J. Reinheimer, J. M. Gee, D. G. Nearhass, Elijah Bates.

AUSTIN, Tex.—The Hillsboro Telephone Company has filed a charter with the secretary of state to do business in Hill, Navarro, Ellis, Johnson, Tarrant, Dallas, Kaufman, Hood, and Parker counties. The capital stock is $200,000 and the incorporators are M. H. Davenport, R. Armstrong, William Helfenstein, and others.

HANNIBAL, Mo.—The New Canton, Cincinnati & Hannibal Telephone Company has been incorporated with principal offices at Hannibal to construct a telephone line from Rockport to Cincinnati Landing, New Canton and Hannibal. Among those interested in the company are Munger Bros. and J. N. Baskett of this city.

BERESFORD, S. D.—Articles of incorporation have been filed for the Gothard Telephone Company with a capital stock of $25,000. The incorporators of the company are C. W. Deane, Wm. Murray, G. D. Williamson, S. Wilson and John Landsen, all of Beresford. The company is organized to do a general local and rural telephone business.

LONGMONT, Colo.—The Northwestern Telephone Company has been organized to operate in Boulder, Routt, Larimer, Arapahoe, and Denver counties, with headquarters at Longmont. The capital stock of the company is $50,000 and the incorporators are M. H. Spere, J. K. Brown, E. V. Bowles, J. A. McCollister and W. W. McCollister.

STEWARTSVILLE, Va.—The Bedford County Telephone and Telegraph Company has been incorporated with an authorized capital stock of $5,000. The officers of the company are as follows: President, R. L. Bearing of Vinton, Va; vice president, J. W. Meador; general manager, J. A. Jeter; treasurer, A. L. Dickinson of Stewartsville.

WESTPORT, S. D.—The Westport and Oneota Rural Telephone Company has been organized at this place. The following officers have been elected: President, Wm. Stoddard; vice-president and purchasing agent, G. W. Wardell; secretary and treasurer, G. P. Siemann. Sufficient funds have been subscribed to insure the construction of the line.

MARTEL, Nebr.—The Martel Farmers' Independent Telephone Company has been incorporated with a capital stock of $5,000. The officers of the company are as follows: President, Albert Egger; vice-president, John A. S. Sittler; secretary, William H. H. Moore; treasurer, Edward Bohmont; directors, Edward Stutheit, Henry Spellman and Herman H. Meyer.

COX'S LANDING, W. Va.—The Cox's Landing and Guyandotte Telephone Company has been organized with the following officers: President, H. W. Carson, Union Ridge; secretary, F. A. Macdonald, Huntington; treasurer, W. B. Frazer, Glenwood. It is the purpose of the company to construct a line from Cox's Landing to Guyandotte and connect with Huntington.

ROSWELL, N. Mex.—The Roswell County Telephone Company has been organized by Herbert Fitzgerald and Robert Kellahin of Roswell; W. C. Oldham and W. E. Lindsay of Portales, and others. The new company has purchased the telephone exchanges at Portales and Texico and the line from Elida to Portales, Texico and Melrose. The system will be extended.

LARGO, Fla.—A new organization to be known as the West Coast Telephone Company has been formed at this place. The officers of the company are as follows: President, W. W. Ulmer; vice-president, Dr. Byrd McMullen; secretary and treasurer, E. B. McMullen; directors, J. S. Taylor, R. L. McMullen, J. C. Whittle, F. M. Campbell, J. A. Walsingham, M. W. Ulmer and others.

BEATTYVILLE Ky.—The Beattyville Home Telephone Company has been organized at this place with a capital stock of $5,000, which may be increased at the option of the stockholders to $10,000. The incorporators of the company are G. A. Cann, J. W. Steele, T. B. Blakey, Monroe G. McGuire, G. S. McDonald, J. C. Richardson, and Mattie McDonald. The new company has bought out the Eastern Kentucky Telephone Company's plant here, which has been in operation about five years. The new company will at once build a line to Irvine, where it already has a franchise and where long distance connections can be secured.

ELBA, Ala.—The Elba Telephone Company has been incorporated to install a telephone service in the town of Elba. The capital stock of the company is $5,000 and the incorporators include many of the leading men of the county, among them being A. S. Douglas, J. M. Garrett, S. N. Rowe, W. H. Coston, H. R. Bradley, J. D. Blue, M. S. Carmichael, J. F. Sanders, E. M. Buck, F. J. Mizell, N. J. Lee.

BARNESBORO, Pa.—At a meeting of representatives of the telephone lines in the northern part of Cambria county it was decided to bring them all under one company to be known as the Northern Cambria Farmers' Telephone Company. The following officers were elected: President, H. M. Gooderman; secretary, James Farabaugh. A charter will be obtained and the service will also be improved.

DENVER, Colo.—Articles of incorporation have been filed for the Colorado & Eastern Telephone and Telegraph Company with a capital stock of $100,000. The incorporators of the company are Edward J. Hall, Edward P. Meany, Melville Eggleston, Charles H. Wilson, and Edward B. Field. The main office will be in Denver and the directors for the first year are Edward J. Hall, Edward P. Meany, and Melville Eggleston.

KIRKSVILLE, Mo.—Representatives of the rural telephone lines of Adair county recently held a meeting in this city in the interest of the proposed Adair County Mutual Telephone Company. It was decided to effect a permanent organization with the following officers: President, W. A. Burress, of Nefy; vice-president, L. L. Mikel, Greentop; secretary, C. G. Young. One representative from each line constitutes a board of directors.

PARSONS, W. Va.—The citizens of this place have organized the Alliance Telephone Company for the purpose of establishing telephone service in Parsons and surrounding country. A constitution and by-laws has been adopted and incorporation papers are being prepared. The officers of the company are as follows: President, L. V. Baker; vice president, G. T. Wilson; treasurer, Albert Mitchell; secretary and general manager, Geo. A. Dean.

GUTHRIE, Okla.—The Mutual Construction and Extension Company of Guthrie has been incorporated with a capital stock of $3,000,000. It is the purpose of the company to build and operate telephone and telegraph lines and exchanges in Oklahoma, Indian Territory, Kansas, Texas, New Mexico, and Arizona. The incorporators of the company are Andrew Van Wormer of St. Louis, Robert G. Rennan of Chicago, William L. Baxter of El Reno.

DETROIT, Mich.—Articles of incorporation have been filed by the Marquette Construction Company, with a capital stock of $25,000, of which $12,500 is paid. The incorporators of the company are: C. M. Foster and T. H. Wagner, of St. Louis, and William R. Woodbury and Thomas A. E. Weadock of Detroit, each holding one share, and Max Koehler, of St. Louis, trustee for 246 shares. This company will build the plant for the Home Telephone Company.

IRONTON, O.—The Home Telephone Company of Ironton has been incorporated, with a capital stock of $50,000. The incorporators are: Robert A. Knapp, E. W. Bixby, S. P. Humphrey, B. F. Forgey and others. The company has an application before the council for franchise rights and it is expected that the franchise will be granted by unanimous vote. The people of Ironton are subscribing rapidly for the new service, contracts having been entered into with 200 business houses.

LAWRENCE, Mass.—Petition has been made for a telephone company to be known as the Lawrence Automatic Telephone Company, which company proposes to incorporate under the laws of the state for the purpose of constructing and operating telephone exchanges. Among those interested are Colonel Albert Clarke, A. L. Ireland, J. G. Ferguson, J. T. Connor, B. M. Wolf, W. S. Littlefield, J. F. Brock, T. V. Johnson, and Henry Delano of Boston, W. J. Bradley, E. L. Arundel, and C. E. Bradley of Lawrence.

SHELBYVILLE, Ind.—Negotiations have been pending for financing and constructing a new telephone system in this city. Recently the Independent company sold out to the Bell company. The new company is being financed and organized by Charles H. Tinall, attorney of this city, who represents capitalists here and at Lafayette, and Charles L. Wedding of Indianapolis. The city council will in a few days be asked for a franchise for the new company, which will construct an underground system that will be first class and up to date in every particular.

BIRMINGHAM, Ala.—The Home Telephone Company of Walker county has been organized here and articles of incorporation for the new company will be filed with the probate judge. The new company has a capital stock of $5,000 and the principal office will be at Jasper, Ala., although the charter will provide that telephone and telegraph lines may be erected and maintained in several adjoining counties. The incorporators are E. M. Cranford, J. N. Odom, Giles E. Jones and others. The company will acquire several miles of telephone lines now in operation in Walker county and it is pro-

posed to construct other lines so that the entire county will have communication with Independent telephone systems. Exchanges will be installed at Jasper and Oakman.

PONCA CITY, Okla.—A charter has been granted to the Home Telephone Company with a capital stock of $100,000. The incorporators of the company are as follows: R. E. Morrison, G. L. Miller, Mike Cunyan, J. J. McGraw, George Brett and W. L. Barnum. A city franchise will be asked for, and work begun on the new enterprise as soon as it is obtained. In addition to putting in a local exchange it is expected that long-distance connections will be arranged for Oklahoma City and Guthrie on the south and Arkansas City and Winfield on the north.

DENNIS, Tex.—The Dennis Telephone Company has been organized at this place for the purpose of improving the local exchange and toll connections with Weatherford on one side, and Lipan and Granbury on the other. The company has bought the interest of Dr. J. H. Fritts in the local exchange and has turned it into a mutual system. Several new farm lines will be built and the toll lines will be improved. The officers of the new company are: President, T. R. Morton; vice-president, E. A. Osborne; secretary, G. W. Woolsey; treasurer, G. P. Jones.

COLUMBUS, O.—The Cincinnati Independent Telephone Company has been incorporated with a capital stock of $10,000. The incorporators of the company are Chas. H. Urban, William Klussman, Edward Puthoff, Arthur R. Morgan, George W. Griffith. The purpose of the company includes the construction and operation of telegraph and telephone lines in Cincinnati and the villages of Hamilton county. Although the company is incorporated to do business in Cincinnati, it is stated the company does not expect to do so, but will furnish telephone service for villages.

ELIZABETH CITY, N. C.—The Norfolk & Carolina Telephone & Telegraph Company has been organized with a capital stock of $50,000. It has absorbed the Portsmouth & Cornland Telephone Company, the Camden Telephone Company, the Elizabeth City Telephone Company and the Elizabeth City and Norfolk Telegraph Company. It is stated that improvements will be made in the service of the whole system. The officers of the company are as follows: President, Dr. L. S. Blades; vice-president and general manager, Charles Guirkin; secretary and treasurer, J. T. McCabe.

KALAMAZOO, Mich.—The Citizens' Telephone Company has been incorporated under the state laws of Michigan for $250,000 by E. W. Bowman, the well known Kalamazoo financier, and associates. The company already has a franchise granting it the right to construct and operate a telephone system in this city, but it desires a franchise from the city council, putting the operations of the new organization directly within the jurisdiction and under the control of that body. As soon as the matter of a franchise is settled preliminary work on the new system will be commenced. The company has good financial backing and it is the purpose to give Kalamazoo and the contiguous territory the best telephone service that can be secured by the installation of the most modern and up to date equipment. The system as now planned will cost between $300,000 and $400,000, and it is the purpose of its promoters to have the system completed and furnishing service to not less than 2,000 subscribers by the fall of 1907.

BREESE, Ill.—An enthusiastic meeting of the business men of Clinton county was recently held in this place for the purpose of effecting an organization of the Interurban Telephone & Telegraph Company. The election resulted in the selection of the following board of directors: B. H. Donne and Aug. J. Klutho of Breese, T. E. Ford and H. V. Murray of Carlyle, Aug. Beckemeyer of Beckemeyer, W. T. Carr and H. Mallrich of Trenton, Frank Schuette of St. Rose, Otto Roberts of New Baden, Henry Schurman of Germantown, B. J. Lager of Aviston. The general offices of the company were located at Breese. After some discussion the capital stock was increased from $15,000 to $20,000. The Interurban Telephone & Telegraph Company is an Independent mutual organization, and is composed of 165 stockholders, business men from eleven different townships in the county. The increase in the capital stock will permit of the distribution of the stock in every township of the county. It is expected to have the new system in operation within a year and long-distance connection will be made with the Kinloch company. It is the purpose of the new company to connect every city, town and village in the county and also to connect up all of the farming communities. The following officers were elected by the board of directors: President, H. V. Murray; vice-president, Henry Schurman; secretary, B. H. Donne; treasurer, Aug. J. Klutho. Constitution and by-laws were adopted.

ELECTIONS AND MEETINGS

NORTH ORANGE, Mass.—The North Orange Telephone Company has elected the following officers: President, S. J. Oliver; secretary and treasurer, Adin Taylor.

SHERMAN, Tex.—The Grayson County Telephone Company has elected directors as follows: W. B. Ritchie, Ed. Christian, W. J. Ritchie, C. D. Crites, Lima, O.; S. W. Porter and C. A. Shock, Sherman, Tex.

ALBION, Ill.—The Edwards County Mutual Telephone Company has elected the following directors: O. A. Bunting, Ellery; Edson Gould, Sr., and Fred Waxler.

HASTINGS, Minn.—At the annual meeting of the Hastings Telephone Company the following directors were elected: N. B. George, H. L. Sumption, and Irving Tood, Jr.

STORY CITY, Ia.—The Story City Mutual Telephone Company has elected the following officers: President, A. M. Henderson; secretary, T. T. Henderson; treasurer, B. R. Dawson.

DEXTER, Minn.—The Farmers' Telephone Company has elected the following officers: President, B. A. Nelson; vice president, B. F. Tanner; secretary, R. Rahilly; treasurer, O. J. Dickens.

QUEBEC, P. Q.—At a recent meeting the Bellechasse Telephone Company elected the following officers: President, Geo. Demers; vice-president, A. B. Dupuis; general manager, J. F. Demers.

FINDLAY, O.—The Findlay Home Telephone Company has elected officers as follows: President, E. C. Taylor; vice-president, C. Y. McVey; treasurer, H. B. Taylor; secretary, Geo. W. Vernor.

BLOOMSBURG, Pa.—The People's Telephone Company has elected the following officers: President, L. W. Welliver; vice president, J. E. Shuman; secretary, D. A. Cox; treasurer, L. W. Lowry.

CRESTLINE, O.—The Crestline Local Telephone Company has elected the following directors: Jacob Babst, A. H. Kinsey, J. F. Morkel, C. R. Callaghan, F. A. Knapp, Fred Wolfram, G. A. Wright.

FOSTORIA, O.—The Citizens' Telephone & Message Company has elected the following officers: President, W. C. Beckwith; vice-president, C. Y. McVey; treasurer, H. B. Taylor; secretary, J. C. Rhodes.

LA CROSSE, Wis.—At a meeting of the stockholders of the telephone company the following directors were elected: W. W. Cargill, Frank P. Hixon, Henry Gund, George H. Gordon and I. H. Moulton.

ORANGE, Tex.—The Orange Telephone Company has elected the following officers: President, E. L. Bruce; vice president, A. L. Ford; secretary and general manager, E .P. Weber; treasurer, W. D. Dean.

HURLEY, S. D.—The Hurley Telephone Company has elected the following officers: President, E. H. Odland; secretary, E. A. Holland; treasurer, John Unruh; directors, Martin Christensen and Pat McDonald.

JANE LEW, W. Va.—The People's United Telephone Company has elected the following directors S. G. Hall, G. W. Forinash, C. W. Davisson, J. A. Oldaker, M. J. Kester. The company will extend its lines.

BERGEN, N. Y.—The Bergen Telephone Company has elected the following officers: President, George R. Fuller of Rochester; vice-president, A. A. Sans; secretary, C. M. Beattie of Rochester; treasurer, C. E. Housel.

AVENUE CITY, Mo.—The Avenue City Telephone Company has elected the following officers: President, Robert Archdeacon; vice-president, E. A. Wadhams; treasurer, Howard Greene; secretary, Clifford Arrick.

DELEVAN, Kan.—The Delevan Telephone Company held its annual meeting at this place recently and elected the following officers: President, George Tompkins; secretary, William Houston; treasurer, Arch Harkness.

FREDERICKSBURG, Va.—At a recent meeting the stockholders of the Upper Rappahannock elected the following officers: President, Robert Beverly; vice-president, E. J. Smith; treasurer, A. P. Rowe; secretary, H. F. Crismond.

ZANESVILLE, O.—The following officers have been elected for the Zanesville Telephone and Telegraph Company: President, C. Y. McVey; vice president, Sherman M. Granger; treasurer, H. B. Taylor; secretary, J. C. Rhodes.

MT. ORAB, O.—The Mt. Orab Telephone Company has elected the following officers: President, Geo. Kratzer; vice president, Cary Layman; secretary, I. L. Edgington; treasurer, P. A. Wickerman; general manager, A. R. Watson.

GARY, S. D.—At the annual meeting of the stockholders of the Gary Telephone Company the following officers were elected: President, A. W. Bartels; vice-president and manager, F. A. Bartels; secretary and treasurer, T. M. Antony.

LITCHFIELD, Minn.—The Litchfield Telephone Exchange Company has elected the following officers for the ensuing year: President, H. L. Peterson; vice-president, G. H. Sullivan; secretary, T. F. McClure; treasurer, G. A. Settergren.

WISNER, Neb.—The Cuming County Independent Telephone Company has elected officers as follows: President, J. E. Albers; vice-president, W. H. Hille; secretary, B. H. Von Seggern; treasurer, J. E. Melcher; manager, J. E. Albers.

RICHMOND, Mo.—At a recent meeting of the Polo and Richmond Telephone Company the following officers were elected:

President, D. A. Kelmel, Polo, Mo.; secretary and treasurer, G. E. Higdon; directors, Thos. Hankins, S. L. Clevenger.

LANE, Kans.—The stockholders of the Lane Telephone Company have elected the following officers: President, John Heiber; vice president and general manager, E. E. Smith; secretary and treasurer, G. W. Nofsinger; directors, J. P. Martin, Chas. Heiber.

JACKSON, Mich.—The annual meeting of the directors of the Citizens' Telephone Company was held in this city. The old directors were re-elected with the exception of George W. Carter of this city, resigned, who was succeeded by C. F. Rood of Grand Rapids.

MESHOPPEN, Pa.—The Meshoppen and Auburn Telephone Company has elected the following officers: President, G. A. Carter; vice-president, O. H. Allen; secretary, A. H. Sterling; treasurer, F. M. Vaughn; directors, G. A. Carter, F. M. Vaughn, A. H. Sterling, O. H. Allen, Andrew Carter.

CLEVELAND, O.—At a special meeting of the stockholders of the United States Telephone Company the following additional directors were elected: R. C. Stifle and A. H. Bower of St. Louis; W. Hopkins of the Erner-Hopkins Company, Columbus; A. B. Taylor of Elyria; Clarence Brown of Toledo, and Herbert Wright of this city.

GRAND MEADOW, Minn.—The Home Telephone Company has elected the following officers: President, W. H. Goodsell; vice-president, Henry Weber, Jr.; secretary and treasurer, L. M. Lindsley; manager, Martin Axness; directors, F. R. Sherwin, J. F. Krause, A. H. Quandt, G. T. Torgrimson, Henry Neumann, A. D. Galon.

BERKSHIRE, N. Y.—The officers of the Home Telephone Company, recently incorporated, are as follows: President, A. E. Smith; vice president, C. D. Phillips; secretary, J. W. Benton; treasurer, Hypolite Thullard; directors, George Brown, C. Royce, E. F. Lynch, M. J. Ford, E. L. Freeland, Frank Robinson, William Freeland.

HECLA, S. D.—At the annual meeting of the Social Telephone Company the following officers were elected: President, J. B. Jeffers; vice president, W. B. Wyckoff; secretary, R. R. Pember; treasurer, George Bingham; directors, J. B. Jeffers, J. B. Beeline, George Bingham, E. A. Wilmsen, J. C. Bonzer, W. B. Wyckoff, and R. R. Pember.

ROWENTON, O.—At the fourth annual meeting of the Sentinel, Rowenton and Lenox Telephone Company the following officers were re-elected: President, C. L. Bailey; treasurer, R. R. Crosby; secretary, Geo. H. Spitler. The report of the treasurer showed a large reserve fund over last year. Several rules were adopted for the promotion and improvements of the service.

BUTTE, Mont.—At a meeting of the directors of the Montana Independent Telephone Company, Harry A. Gallway, the well known Butte mining man, was chosen president; F. B. Moss, of Billings, was elected first vice-president; M. S. Largey, of Butte, second vice-president; Charles J. Kelly, of Butte, secretary and treasurer; Elmer B. Jones, of Salt Lake City, managing director.

WEISER, Idaho.—A meeting of the Pacific & Idaho Northern Railway Telegraph & Telephone Company and the Idaho Construction Company, connected with the Pacific and Idaho Northern Railway Company, for the election of officers resulted as follows: President, L. C. Van Riper; vice-president, Frank W. Hunt; secretary, Frank Estabrook; directors, R. E. Lockwood and Webster Bishop.

NESTORVILLE, W. Va.—At the annual meeting of the Citizens' United Telephone Company held at this place, the following officers were elected: President, James Holesberry; vice president, Jno. Walton; secretary-treasurer, C. R. Stalnaker; directors, John Bolyard, Emory Wau, Jonas Hoffman, Franklin Moore, Ashford Stalnaker, James Holesberry, John Walton; general manager, J. W. Meyers.

PENN YAN, N. Y.—At the annual meeting of the Crosby and Barrington Telephone Company the following officers were elected for the ensuing year: President, Charles E. Guile; vice-president, Howard S. Fullager; secretary and treasurer, Herbert C. Overshire; directors, Charles E. Guile, T. W. Windgagle, David Hoover, Isaac Crosby, Samuel L. Thayer, Herbert C. Overshire and Howard S. Fullager.

PORTSMOUTH, O.—The stockholders of the Home Telephone Company recently elected the following officers: President, Wm. R. Fee; vice president, Jos. F. McKell; treasurer, Dr. W. D. Tremper; secretary and general manager, E. E. Knox; directors, Dr. W. D. Tremper, L. D. York, H. S. Grimes, Wm. R. Fee, and E. E. Knox, all of Portsmouth; J. S. McKell and W. V. Schwartzbaugh, Chillicothe.

CLEARFIELD, Pa.—At the annual meeting of the stockholders of the Huntington & Clearfield Telephone Company the following officers were elected for the ensuing year: President, Ellis L. Orvis; vice-president, A. W. Lee; secretary and treasurer, G. H. Lichtenthaler. Reports were submitted showing the business of the Huntington & Clearfield Telephone Company, The Indiana Telephone Company and the Cambria County Telephone & Telegraph Company to be in a very flourishing condition. The business of the past year has been such as to warrant the board of directors in making several extensions in order to still further increase their facilities and earning power.

HUMBOLDT, Nebr.—The stockholders of the City Mutual Telephone Company recently held their annual meeting and re-elected the old board of directors with the exception of W. Skalak, who was succeeded by A. A. Turner. Reports showed the affairs of the company to be in a prosperous condition, extensive improvements having been made during the past year, with many more contemplated.

GROVE CITY, Minn.—The Grove City and Rosendale Telephone Exchange has elected the following officers: President, O. P. Willner; vice-president, Peter Madson; secretary, Charles Nelson; treasurer, A. Liedholm; manager, A. P. Nelson; directors, A. P. Nelson, A. Liedholm, Albert Waylander, A. M. Person, Charles Nelson, H. L. Larson, C. C. Teitan, Peter Hanson, O. P. Willner, A. M. Nelson and Peter Madson.

MONMOUTH, Ill.—At the annual meeting of the Monmouth Telephone Company the old board of directors was re-elected as follows: J. E. Lanphere, W. J. McQuiston, H. B. Smith, R. Lahann, George Schussler, J. F. Searles, James Galbraith. The directors then elected officers as follows for the coming year: President, C. C. McClung; vice-president, J. E. Watson; secretary, W. J. McQuiston; treasurer, H. B. Smith.

LAKE NEBAGAMON, Wis.—The Nebagamon Telephone Company recently held its annual meeting at which time the following officers were elected for the ensuing year: President, W. S. Carr; vice-president, Barnard Skare; secretary, Dr. R. S. Ogilvie; treasurer, Martin Hendrickson. The above officers, together with Peter Neros, Peter Nelson, Carl Anderson, J. S. Crowley and Dr. F. G. Johnson, constitute the board of directors.

PEORIA, Ill.—The Illinois Independent Telephone Association at its recent meeting elected the following officers for the coming year: President, E. R. Conklin, Aurora; vice president, Manford Savage, Champaign; secretary, C. B. Cheadle, Joliet; treasurer, C. B. Haskins, Decatur; executive committee, E. R. Conklin, C. B. Cheadle, C. O. White, Princeton; J. W. Barrett, Pekin; Manford Savage, C. S. Haskins, W. H. Bassett, St. Louis.

CHARITON, Ia.—The Chariton and Newbern Telephone Company recently held its annual meeting in this place and elected the following directors: G. J. Stewart, H. M. Wilson, J. A. White, F. W. Hinkey, and Dr. S. W. Thomas; president, G. J. Stewart; vice-president, H. M. Wilson; secretary and treasurer, G. W. Ensley. The system has been in operation about two years and is giving good service to its patrons, with satisfactory returns to the company.

CHICAGO, Ill.—The National Inter-State Telephone Association, which changed its name to the International Telephone Association at its recent convention held in this city, has elected the following officers for the ensuing year: President, James B. Hoge, Cleveland, O.; vice-presidents, Theodore Gary, Macon, Mo., and Charles E. Sumner, Portland, Ore.; treasurer, J. G. Splane, Pittsburg, Pa.; secretary, Charles C. Deering, Boone, Ia.; assistant secretary, J. A. Harney, Cleveland.

UNIONDALE, Pa.—The North Eastern Pennsylvania Telephone Company held its annual meeting at this place and elected the following officers for the coming year: President, F. J. Osgood, Forest City; vice president, Fred Kennedy, Mt. Pleasant; secretary, C. A. Wademan, Uniondale; treasurer, E. K. Lee of Farno; general manager, Frank E. Benson of Jackson. Reports showed the total revenues from all sources during the past year to be $6,109.94. Five hundred dollars has been paid on the debt of $2,500 and the remainder devoted to new lines and equipments.

MILWAUKEE, Wis.—The Milwaukee Independent Telephone Company, recently incorporated and which has an application before the council for a permit to build an Independent telephone in Milwaukee, has perfected its organization by the election of the following officers: President, H. D. Critchfield; vice-presidents, E. A. Wadhams and J. S. Nortwick; treasurer, Howard Greene; secretary, Clifford Arrick; directors, Charles J. Chapin, Milwaukee; H. D. Critchfield, Howard Greene, Alvin A. Kletzsch, George P. Fayer, Wilmer Sieg, E. A. Wadhams, J. B. Whithall, all of Milwaukee; Clifford Arrick, Indianapolis; John M. Baer, W. W. Cargill, J. C. Harper, B. G. Hubbell, Richard Valentine, J. S. Van Nortwick.

KEWANEE, Ill.—The Kewanee Home Telephone Company recently held its annual meeting and officers were re-elected as follows for the ensuing year: President, W. I. Hibbs; vice president, F. A. Ellithorp; secretary-treasurer, Dr. A. C. Shoemaker; directors, J. N. Anderson, G. B. Thompson, John A. Law, S. M. Parke and W. H. McMillan. All of the officers and directors are from Pittston, Pa. F. M. Ashe is manager of the company and under his capable management the business of the company has been greatly increased, over 350 telephones having been installed during the past year. The system will be extended in this city and lines will be built to Rock Island, Sterling and Peoria before the summer

is over. There are at present about 1,850 telephones in service with quite a number on the waiting list.

ROSEVILLE, Ill.—The stockholders of the Roseville Telephone Company recently held their annual meeting at this place and the following officers were elected for the ensuing year: President, Henry Kirkpatrick; vice-president, J. E. Lanphere, of Ponemah; secretary and treasurer, W. J. McQuiston, of Monmouth; manager, Walter Waugh; directors, Henry Kirkpatrick, George Rayburn, C. O. Penny, Walter Waugh, W. J. McQuiston, J. E. Watson, J. E. Lanphere. Several matters of importance regarding the future policy of the company were discussed. It is the intention to enlarge the plant and make it modern and up-to-date. The past year has been a very prosperous one, and plans are being laid for a wider field of action in the future.

MEADVILLE, Pa.—The Eastern Crawford Telephone Company, which was recently granted a charter, has completed its organization by the election of the following officers: President, J. D. Downing; vice-president, J. R. Andrews; secretary and treasurer, H. M. Dickson; general manager, John Wright. The company will operate in connection with the Meadville Telephone Company and under the same management, although a separate organization. The proposition embraces a stock issue of $20,000, all of which has been sold, and a bond issue of like amount will be made at 5 per cent. The greater part of the company's system is already completed, but additional toll lines will be constructed and the company has over 400 contracts for this territory.

MARION, Ind.—At a meeting of the stockholders of the Citizens' Automatic Telephone Company the organization of the company was completed by the election of the following officers: President, C. L. Fisher, Chicago; vice-president, E. K. Seymour, Chicago; secretary, Albert E. Wilson, Chicago; treasurer, James S. Sisson, Chicago; manager, O. L. Barger of Marion; directors, Fred O. Eward, S. L. Strickler, and James Sisson of Marion, H. A. Harris, Albert E. Wilson, and E. K. Seymour of Chicago, and O. L. Barger of Converse, Ind. The directors were authorized to issue bonds in the sum of $300,000, of which $60,000 must be retained for future extensions and the remainder to be sold and the proceeds used for the construction and installation of the plant in this city.

MCCOMB, Ill.—At the annual meeting of the McComb and Western Illinois Telephone Company the following officers were elected for the ensuing year: President, C. M. Erwin; vice-president, George Kerman; secretary, E. Y. McLean; treasurer, C. V. Chandler; directors, C. M. Erwin, George Kerman, W. I. Savidge, L. E. Guy, and Belle Erwin. Reports of the various officers showed the company to be in a very satisfactory condition. No dividends were declared, but the earnings were very satisfactory to the stockholders. As in the past the company will continue to reinvest its profits in extensions and improvements. In the past year the company has constructed 250 miles of lines, has acquired two new exchanges, at Camp Point and Golden, and has greatly extended its long distance service.

ST. PETER, Minn.—The stockholders of the Nicollet County Telephone Company recently held their annual meeting at this place and elected the following officers: President, M. P. Quist; secretary, W. G. Laumann; treasurer, F. M. Donahower; general manager, C. C. Nelson; directors, C. C. Nelson, M. P. Quist, New Sweden; A. W. Sternke, Gaylord; Dr. Z. W. Flowers, Gibbon; P. A. Retrum, Lafayette; W. F. Stege, Nicollet; James Bennett, M. B. Johnson and W. G. Laumann, St. Peter. This is one of the most important Independent organizations in the state. Since the last annual meeting the company has built two exchanges, with their contingent lines, and now operates exchanges at St. Peter, Cleveland, Kasota, New Sweden, Nicollet, Gaylord, Gibbon and Lafayette, and has some 450 miles of wire. An unusually large expenditure was made during 1905 for additions and improvements, and yet the company was able to declare a dividend of 10 per cent.

ORDINANCES AND FRANCHISES

NECHE, N. D.—F. E. Corson, of Fargo, has been granted a telephone franchise in this place.

DALLAS, Wis.—The Farmers' Telephone Company has been granted a franchise at this place.

OCONOMOWOC, Wis.—The Badger Telephone Company has been granted a franchise in this place.

WAKEFIELD, R. I.—The Home Telephone Company of Providence is seeking a franchise in this place.

BOSTON, O.—The Boston Independent Telephone Company has applied for a franchise in this place.

LOYAL, Wis.—The Local Telephone Exchange Company has been granted a franchise at this place.

NEW STRAIGHTSVILLE, O.—The Home Telephone Company of Logan is seeking a franchise in this city.

EFFINGHAM, Ill.—The Kavanaugh Telephone Company has accepted a new franchise in Effingham and has acquired the property of the Central Union Telephone Company. The Kavanaugh company has about 300 subscribers and the consolidation will form one exchange of about 600 subscribers.

NEW CARLISLE, O.—The Home Telephone Company is seeking a franchise to establish an exchange in this city.

MT. VERNON, O.—The Mt. Vernon Telephone Company has secured a franchise to install an underground system.

MOOSE LAKE, Minn.—The Bernum Telephone Company has been granted a franchise to establish a local exchange.

RED LAKE FALLS, Minn.—The Tri-State Telephone Company of Minneapolis has been granted a franchise in this place.

SLOAN, Ia.—The New State Telephone Company has been given permission to erect and maintain its lines within this place.

SCHENEVUS, N. Y.—A franchise has been granted to Orra L. Tipple, who will organize an Independent telephone company.

EAGLE BEND, Minn.—A. King of Frazee, Minn., is seeking a franchise at this place with a view to installing a local exchange.

SKAGWAY, Alaska.—The town council has passed an ordinance granting a telephone franchise to the Alaska General Electric Company.

PORTERSVILLE, Cal.—H. F. Scorrille, of Corona, has filed application for a franchise to build and operate a telephone system in this place.

ST. HILAIRE, Minn.—Messrs. Simons & Bourdon, of Red Lake Falls, have been granted a franchise to install a telephone system at this place.

DEPOSIT, N. Y.—B. E. Radeker and C. E. Scott are seeking a franchise to put in subways in the streets of Deposit for electric and telephone wires.

CLEAR LAKE, S. D.—The Citizens' Electric Light and Telephone Company has been granted a franchise to install a telephone system at this place.

FT. SMITH, Ark.—The Pan Telephone Company, incorporated a short time ago, will make application for a franchise to install underground wires.

PHILIPPI, W. Va.—The People's United Telephone System will make application for a franchise to install a mutual telephone system in Philippi.

GREAT FALLS, Mont.—The Montana Independent Telephone Company has been granted a franchise to establish a telephone system at this place.

MT. UNION, Ia.—The Henry County Telephone Company, which recently applied for a franchise at this place, has been granted same for a period of twenty years.

MOORETON, N. D.—Matthew J. Hafener, one of the incorporators of the Farmers' Telephone Company, is seeking a franchise in this place in behalf of the company.

GREAT FALLS, Mont.—An ordinance has been passed by the city council granting the Montana Independent Telephone Company the right to install its service in this city.

ATTICA, N. Y.—At a special meeting of the directors of the board of trustees permission was granted the Attica Home Telephone Company to enter the village and establish its system.

VINTON, Va.—The town of Vinton is advertising for bids for a franchise to install a telephone system in the town of Vinton. All bids should be in writing and addressed to W. S. Pollard.

WEST PALM BEACH, Fla.—The ordinance granting a franchise to the West Palm Beach Telephone Company has been passed and the company will begin the construction of its plant in a short time.

LOWELL, Mass.—At a recent meeting the board of aldermen voted to grant the franchise sought by the Merrimack Valley Independent Telephone Company. The franchise gives the company almost unlimited rights in the city.

WEST POINT, Neb.—An Independent telephone company is making an effort to gain an entrance into West Point and the city attorney has been ordered to draft an ordinance for presentation to the council in favor of such franchise.

ANACORTES, Wash.—The Home Telephone Company of Puget Sound has made application to the council for a twenty-five year franchise to install a local telephone system. The Farmers' Mutual Telephone Company has also made application for a franchise.

WHEATLAND, Cal.—The Wheatland Independent Telephone Company is petitioning the board of supervisors for a franchise which will give it the privilege of extending its lines throughout Yuba county, outsde incorporated cities and towns. Frank W. Anderson is manager of the company.

NEW LONDON, Wis.—The Interurban Telephone Company has applied for a 30-year franchise. The Wolf River Telephone Company, the predecessor of the Interurban company, secured a franchise in 1896, which expired in 1901, and since that time the company has been operating without a franchise.

OSBORN, O.—At a special meeting of the city council the Home Telephone Company of Dayton was granted a franchise to operate a telephone system in this place. This adds one more town to the

already long list of the Home company, and enables it to cover the entire county. The company is also installing an exchange at Sulphur Grove.

LAWRENCE, Mass.—The Lawrence Automatic Telephone Company has presented an application to the city council for a franchise in Lowell and the same will be taken up at its next meeting. The franchise provides that there shall be no rental charges until the company shall have at least 1,000 subscribers connected with its exchange in this city.

GREELEY, Colo.—The Northern Telephone Company, Greeley, Colo., has been granted a franchise to establish an Independent telephone system in Berthoud. It is the purpose of this company to apply for franchises in eight of the largest towns in northern Colorado. Central energy and automatic equipment will be used in the large towns. Two magneto visual signal exchanges of several hundred capacity are now under construction.

QUINCY, Ill.—The board of supervisors has granted the petition of the Home Telephone Company to construct and operate telephone lines throughout Adams county. The Home Telephone Company is about completing its plant in this city, which when completed will cost in the neighborhood of a half million dollars. The system will begin operation with 3,000 lines in service, and it is expected that by the end of the year 5,000 subscribers will have been secured. The officers of the company are: President, Jackson R. Pearce; vice president and attorney, Frank J. Herrick; secretary and treasurer, J. H. Murphy; manager, Frank A. Parker.

NEW YORK, N. Y.—The United States Automatic Telephone Company, Elias E. Ries president, with offices at 116 Nassau street, has filed with the secretary of the board of estimate of New York city an application for a franchise to construct and operate a new telephone system. The company offers to put in telephones at a charge of $12 a year for residences and $24 a year for business houses with a charge of 2 cents in each borough and 10 cents for pay calls to any part of the city. It also offers to supply each city department, hospital, and charitable institution with one telephone free up to 1,000 calls a year, and 2 cents for each call above 1,000.

NEW CONSTRUCTION

COBDEN, Minn.—The Cobden Telephone Company will construct a rural line.

MEDINA, O.—The Medina Telephone Company will install a new exchange at Sharon.

CHARLES CITY, Ia.—The Rural Telephone Company will construct additional lines.

WESTVILLE, Ind.—The Westville Telephone Company will establish an exchange at Wanatah.

GARY, S. D.—The Gary Telephone Company contemplates the construction of several rural lines.

DAYTON, Va.—The Dayton and Bridgewater Telephone Company will install an exchange at this place.

WATERVILLE, Minn.—The Waseca Telephone Company will establish a central office in Waterville.

HAPPY VALLEY, Mo.—The Farmers' Mutual Telephone Company will install an exchange in this place.

SYRACUSE, O.—The Syracuse Citizens' Telephone Company will build lines to Racine, Minersville, and Pomeroy.

ENTERPRISE, W. Va.—The Enterprise Telephone Company contemplates installing an exchange at Middlebourne.

LANGDON, N. D.—The Langdon Telephone Company will construct a telephone line from this place to Nekoma.

GROTON, S. D.—The Groton-Ferney Telephone Company will construct a number of additional lines in the vicinity of Warner.

PORT ARTHUR, Ont.—The town council has awarded a contract for the construction of new telephone exchange at a cost of $15,615.

IREDELL, N. C.—The Iredell Telephone Company will begin the construction of its system as soon as the material can be secured.

BLAKELEY, Minn.—The Farmers' & Merchants' Mutual Telephone Company will build a telephone line from this place to Belle Plaine.

SPRINGFIELD, Mo.—The Springfield Telephone Company will build a line from Springfield to Leavenworth, Kans., in the near future.

SEATTLE, Wash.—Plans have been filed by the Independent Telephone Company for its new exchange building which will cost $10,000.

SALINA, Kans.—The Salina Telephone Company is making arrangements for the construction of a new exchange building in this place.

BELFAST, Ark.—Jas. Carson is planning the construction of a telephone line from this place to Detroit, Corwin and other places in Arkansas.

COLUMBIA CITY, Ind.—The Farmers' Mutual Telephone Company is preparing to build a number of rural lines and is in the market for material.

COLUMBUS, Ind.—At a recent meeting of the directors of the Citizen's Telephone Company it was decided to install an exchange in East Columbus.

CLARKSDALE, Miss.—It is stated that the Memphis Telephone Company will put in an exchange at this place in competition with the Cumberland Telephone Company.

ELSINORE, Cal.—R. J. Dunn of Redlands is making arrangements for the installation of an electric lighting plant and a telephone system at this place, which will cost about $9,000.

SALT LAKE CITY, Utah.—The Utah Independent Telephone Company contemplates constructing lines to Mammoth and Robinson. The company will also establish an exchange at Eureka.

ST. JOHN, N. B.—The Central Telephone Company, with headquarters at Sussex will install an exchange in this city. The company contemplates increasing its capital stock to $1,000,000.

SALT LAKE CITY, Utah.—The Utah Independent Telephone Company contemplates the construction of telephone lines to Mammoth and Robinson, and will also establish an exchange at Eureka.

INDIANAPOLIS, Ind.—The interurban railway company which will operate between this city and Danville will install a telephone system along its line. The road is owned by the Schoepf-McGowan syndicate.

ROCKFORD, Ill.—The White Oak Telephone Company has made arrangements for a double line from this city to Darlington, one giving direct communication and the other giving service to the farmers along the route.

WINNIPEG, Man.—The Winnipeg Electric Street Railroad Company will install a telephone line between Winnipeg and Lac de Bonnet, a distance of about 60 miles. Wilford Phillips is general manager of the company.

ELGIN, Nebr.—The Antelope County Mutual Telephone Company will establish an exchange at Coldwater. The company will also make an effort to secure a franchise at Neligh with a view to establishing an exchange at that place also.

TOPEKA, Kan.—Henry Bennett has been awarded the contract for the Independent Telephone Company's new office building. The contract price is $25,000. Work will begin at once and the contract calls for the completion of the building by November 1.

WYNNEWOOD, I. T.—The Commercial Club has decided to build a telephone line to Iona, I. T., and to Chigley. The large amount of business which comes from these places makes it necessary that a line be built at once. The line will be turned over to the Spencer Telephone Company to operate.

WAWPECONG, Ind.—The Cedar Line Telephone Company, recently incorporated with a capital stock of $1,000, has for its object the construction and operation of a telephone system in Wawpecong and vicinity. The directors of the company are as follows: John Christie, Isaac Myers, and Walter Shiveley.

SPURGEON, Ind.—The Spurgeon Home Telephone Company recently incorporated at this place will establish a telephone system in Pleasantville, with lines throughout the western part of Pike and adjoining counties. The directors of the company are John W. Scales, J. A. Wiggs, Alva Dougan and Henry Sultan.

HARRISBURG, Nebr.—The Overland Telephone Company, an organization of farmers and ranchmen, has completed seventy miles of line and will soon begin the construction of forty miles more. When all lines now under course of construction are completed Banner county will have over 225 miles of Independent telephone lines.

COLLEGE STATION, Tex.—The Agricultural and Mechanical College has decided to install a local telephone exchange connecting all the business houses and business offices with each other and with the Bryan exchange and long distance lines. A company has been organized with a capital stock of $2,000 and a charter has been drawn up ready to be filed with the secretary of state. The incorporators are Profs. Nogle, Geisecke, Brown, Spence and Weir. The system will be installed during the summer.

KEOKUK, Ia.—Plans have been completed by the Mississippi Valley Telephone Company to build a new and complete, up to date plant in this city, and it is expected that work will begin in the near future. Nearly $100,000 will be expended by the company on the new system, which will include the construction of a new exchange building, the placing of underground conduits, and the installation of the latest improved type of switchboard and instruments. General Superintendent W. B. Burke of Decatur will have charge of the work.

OSKALOOSA, Ia.—Preparatory to the construction of an exchange building, which will be modern and up to date in every respect, the Home Telephone Company of this city has purchased a site in the business part of the city. The company contemplates extensive improvements in its system, which will include reconstruction of many lines and the installation of a considerable amount of underground and aerial cable. A central energy switchboard of standard

construction will enable the company to give excellent service to its subscribers.

CLINTON, Ind.—Plans have been received for the new building which the Indiana Telephone and Telegraph Company will erect in this city. The stockholders of the company held a meeting in Indianapolis recently and appropriated $34,000 for the new exchange. The Indiana Telephone & Telegraph Company was formerly the Horney Telephone Company, which was the first to be instituted in Clinton. At the time the first exchange was built there were only about thirty telephones in use. Since that time the business of the company has increased until there are about 800 telephones in service.

UNDERGROUND CONSTRUCTION

CEDAR RAPIDS, Ia.—The Cedar Rapids and Marion Telephone Company has been ordered to place its wires in this place under ground.

BLOOMINGTON, Ill.—The city council is endeavoring to compel the telephone companies to place all wires under ground in the fire districts.

CLINTON, Ia.—The council has passed an ordinance requiring telephone companies to place their wires in underground conduits in the business section of the city.

RICHMOND, Ind.—One of the requirements of the ordinance recently passed by the city council regarding telephone companies is that all telephone companies when reconstructing their plants shall place all wires under ground and that the maximum annual rate of telephone rental shall be $18 for residence telephones and $36 for business houses.

CORNING, N. Y.—The board of public works has approved of plans submitted by H. C. Calhoun, general manager, and William Delari, construction superintendent of the Consolidated Telephone Company, whereby the Corning Telephone Company will place the greater part of its wires in underground conduits. The company will spend $40,000 for the purpose at once.

EXTENSIONS AND IMPROVEMENTS

SIDNEY, O.—The Sidney Telephone Company will extend its system.

ORBISONIA, Pa.—The Orbisonia Telephone Company will extend its lines.

CHARDON, O.—The Chardon Telephone Company will make extensions.

IRVING, Ia.—The Irving Telephone Company will extend and improve its system.

CHURCH'S FERRY, N. D.—The Rural Telephone Company will extend its system.

NEW WOODSTOCK, N. Y.—The Cummings-Stoddard Telephone Company will make extensions.

BORDULAC, N. D.—The Haven Telephone Company of this place will build additional telephone lines.

WILLMAR, Minn.—The Kandiyohi County Telephone Company will make improvements in its system.

BELLEVILLE, O.—The Belleville Telephone Company will increase its capital stock from $10,000 to $75,000.

LAWRENCE, O.—The Lawrence Telephone Company will thoroughly overhaul and improve its system.

CRANBROOK, B. C., Can.—The Cranbrook Electric Light and Telephone Company will extend its lines.

BODE, Ia.—The Bode Union Telephone Company will install new switchboards at Bode and Bradgate.

YATES CITY, Ill.—The Ideal Telephone Company will make many improvements in its system in this city.

ROANOKE, Ind.—The Roanoke Telephone Company is planning for extensions and improvements of its system.

STAPLES, Minn.—The Staples telephone exchange is to be rebuilt along modern lines and improved and enlarged.

MELROSE, Wis.—The Central Wisconsin Telephone Company will spend $10,000 in improving its system in this place.

SANTA FE, N. M.—The Santa Fe Telephone Company will make many improvements and extensions in its system.

CONWAY, Ark.—The Conway Telephone Company will extend its system and will erect a new exchange building.

HUNTINGTON, W. Va.—The Huntington & Teays Valley Telephone Company will rebuild a portion of its lines.

TAPPAN, O.—The Tappan Telephone Exchange will install a new switchboard and otherwise improve its system.

FORT WILLIAM, Ont.—The council of Fort William has voted $10,000 with which to improve and enlarge the municipal telephone system. A multiple switchboard of 4,500 lines capacity will be installed and other improvements will be made.

ROME, N. Y.—The Rome Home Telephone Company will improve its system in this city and surrounding country.

NEKOOSA, Wis.—The Nekoosa Telephone Company will rebuild its system at this place and will install a new switchboard.

IRON MOUNTAIN, Mich.—The Menominee Range Telephone Company contemplates making many improvements in its system.

LEBANON, O.—The Valley Telephone Company contemplates improvements which will cost in the neighborhood of $13,000.

PONTIAC, Mich.—The Oakland Telephone Company contemplates making many improvements in its system at this place.

STANLEY, N. B.—The Stanley Telephone Company contemplates the expenditure of a large sum of money in the improvement of its system.

MADISON, Mo.—The Mutual Telephone Exchange will make extensive improvements in its system, including the erection of a new exchange building.

GARRETT, Ind.—The Garrett Telephone Company contemplates the expenditure of $15,000 in increasing its plant, installing new equipment and extending its lines.

LEOLA, S. D.—The Western Mutual Telephone Company of this place will extend its line to Aberdeen, where it will connect with the Dakota Central Telephone System.

HILLSDALE, Mich.—The Bryan Telephone Company, with headquarters at Bryan, O., will extend its lines into Hillsdale county and is seeking a franchise to enter this city.

VANDALIA, Mo.—The Union Telephone Company is making arrangements to greatly improve its system, installing new cable and making it up to date in every particular.

FARGO, N. D.—The Traill County Telephone Company of Clifford contemplates extending its service during the year. The company now has over 700 miles of line and about 600 telephones in service. John Carmody is secretary of the company.

MOULTRIE, Ga.—To meet the growing demand of its business in this place the Moultrie Telephone Company is making arrangements to extend its system. The new exchange will have a capacity of 400 telephones and will be put in in a short time.

ECHO, Ore.—The Butter Creek Telephone Company will extend its line from Echo to the government reservoir site at Hermiston, and also to the different government engineers' camps along the proposed canal line. It is intended to connect all the districts under the government irrigation system with the central office.

DILLON, Mont.—The Southern Montana Telephone Company is planning extensions into the Big Hole basin, which when completed will add over two hundred miles of lines and between 75 and 100 telephones to the system. Work will be commenced on the extensions as soon as the material can be secured. Frank Hazelbaker is secretary of the company. Almost all the ranchers around Wisdom, Jackson and Fox have signed contracts for service for two years, as have many others in other parts of the basin. Practically all of the ranches in the basin will be supplied with telephone service.

LLANO, Tex.—The Texas Telephone & Telegraph Company is preparing to expend large sums of money on all of its important toll lines, which will include the rebuilding of the entire Austin-Llano line, the Llano-Mason line and the Burnet-Lampasas line. The new work will require a large amount of material including wire, poles, cross arms, braces, etc., as over $10,000 will be spent upon the new improvements. A. J. Miller is superintendent of the company. The company now has 1,100 miles of toll lines, operates six exchanges, and has in operation, including its farmer line connections, over 1,600 telephones.

FINANCIAL NOTES

MADELIA, Minn.—The Madelia Telephone Company recently declared a 6 per cent dividend.

OWASSO, Mich.—The Union Telephone Company has declared a quarterly dividend of two per cent.

HUMBOLDT, Neb.—The City Mutual Telephone Company has increased its capital stock to $25,000.

NORWALK, O.—The Miller Anchor Company has increased its capital stock from $25,000 to $40,000.

EMINGTON, Ill.—The Emington Telephone Company has declared a dividend of $5 on each share of its stock.

NEWARK, Ill.—The Farmers' and Merchants' Telephone Company has increased its capital stock $15,000.

HUDSON, N. Y.—The Columbia Telephone Company has paid its seventh quarterly dividend of 1¼ per cent.

LAKE NEBAGAMON, Wis.—At its recent annual meeting the Nebagamon Telephone Company voted to increase its capital stock from $5,000 to $10,000 and the new stock was at once practically

all placed. The company is doing a successful business and has a steady increase.

DES PLAINES, Ill.—The Des Plaines Telephone Company has increased its capital stock from $10,000 to $14,000.

CLIFFORD, N. D.—The Traill County Telephone Company has increased its capital stock from $30,000 to $50,000.

HEBRON, Ill.—The Farmers' New Era Telephone Company has increased its capital stock from $30,000 to $50,000.

MINIER, Ill.—The Minier Mutual Telephone Company has increased its capital stock from $15,000 to $25,000.

CONWAY, Ark.—The Conway Telephone Company proposes to issue from $2,000 to $4,000 of 7 per cent 10-year bonds.

MONROE CITY, Mo.—The Farmers' & Merchants' Telephone Company has increased its capital stock from $3,000 to $6,000.

BRUNSWICK, O.—The Brunswick Independent Telephone Company has increased its capital stock from $5,000 to $20,000.

ELMWOOD, Wis—The Highland Telephone Company has filed an amendment increasing its capital stock from $1,000 to $10,000.

NEW HAMPTON, N. H.—The Winona Telephone Company has notified the secretary of state of a $3,000 increase in its capital stock.

NEW BEDFORD, Mass.—The Automatic Telephone Company has declared the regular quarterly dividend of 1 per cent, payable July 2.

SPARTA, Tenn.—The Gainesboro Telephone Company will issue $100,000 in bonds and greatly improve its exchange and extend its toll lines.

SCOTTS BLUFF, Nebr.—The Platte Valley Telephone Company has filed amended articles of incorporation increasing its capital stock to $100,000.

AUBURN, N. Y.—The South Cayuga Telephone Company of Poplar Ridge has filed certificate showing increase of its capital stock from $15,000 to $20,000.

MEADOWS, Idaho—The Meadows-Warren-Roosevelt Telephone Company contemplates doubling its capital stock for the purpose of completing and extending its system.

NEWARK, O.—The Newark Independent Telephone Company has just paid its semi-annual dividend on preferred stock and a 2 per cent quarterly dividend on common.

MONROE, Wis.—The Monroe Telephone Company has declared a 6 per cent dividend on the stock of the company, which is the first dividend declared on the stock since 1903.

ALBANY, N. Y.—The Home Telephone Company has declared a dividend of 1 per cent, payable July 29. This is the second dividend the company has declared, the first having been made in April.

TECUMSEH, Nebr.—The Johnson County Home Telephone Company has filed an amendment to its articles of incorporation with the secretary of state, increasing its capital stock from $50,000 to $100,000.

BRADFORD, Pa.—A meeting of the stockholders of the Morrison's Cove Telephone Company will be held at Waterside August 1, to vote upon a proposition to increase the capital stock from $25,000 to $60,000.

DUSHORE, Pa.—The telephone company at this place has declared a dividend of 3 per cent on its capital stock. This is the second dividend declared, and the company was organized only October last.

DUBOIS, Neb.—Amendments to the articles of incorporation have been filed by the DuBois Telephone Company, thereby increasing its capital stock to $10,000, and confining the sale of stock only to those who rent telephones from the company.

COMFREY, Minn.—The Comfrey Rural Telephone Company at its annual meeting declared a dividend of 15 per cent. The stockholders were well pleased with the condition of the affairs of the company and additional stock was easily disposed of.

KANSAS CITY, Mo.—The gross receipts for the Home Telephone Company for the three months ending June 30 were $128,184.38, according to a statement tendered the city comptroller. Of this amount 2 per cent was paid to the city, amounting to $2,563.68.

CLINTON, Mo.—The stockholders of the Mutual United Telephone Company held a meeting on the 11th inst. and voted to increase the capital stock from $15,000 to $100,000 and authorized an issue of bonds to the amount of $60,000 for improvements and the construction of lines and exchanges.

DETROIT, Mich.—The Home Telephone Company has filed notice of an increase in its capital stock to $6,000,000 and that $3,000,000 has been paid in, $100,000 in cash and the balance in property, the nature of which is not stated. Practically all the stock is held in the name of Chas. H. Hood, as trustee.

CLAYTON, Mo.—A certificate has been filed in the recorder's office by H. W. Karrenbrock, president, and Joseph B. Greensfelder, secretary, of the Suburban Telephone Company, increasing its capital stock from $100,000 to $600,000. The company was organized by J. D. Housman as an Independent system about two years ago, but its control has since been acquired by the Kinloch Telephone Company, which is extending its lines throughout the county.

PITTSBURG, Pa.—The Keystone Telephone Company has completed its first fiscal year under its new management and shows a surplus for eleven months of $80,000 above its $200,000 interest on its $4,000,000. The company spent $78,000 for renewal in addition to its operating expenses. It earned $825,000.

SUMMITVILLE, Ind.—The Summitville Telephone Company has executed a mortgage in favor of Maurice Warner of Summitville, which covers all the property of the company and is issued to secure bonds, which are to be ten in number and of $200 each, the last due in five years and bearing 8 per cent interest, payable annually.

KENTON, O.—At the regular quarterly meeting of the directors of the Kenton Telephone Company the manager's report showed a net increase of 75 telephones the past three months, and a steady demand for further increase. A 2 per cent dividend was declared. The company now has nearly 1,350 subscribers, of which nearly 425 are farmers.

TECUMSEH, Neb.—At a meeting of the stockholders of the Johnson County Home Telephone Company it was decided to increase the capital stock from $50,000 to $100,000. The funds will be used in establishing a complete county service. The reports of the growth of the company during its short existence were very gratifying to the stockholders and officers.

GENEVA, Neb.—Articles of incorporation have been filed by the Fillmore County Telephone Company increasing its capital stock to $100,000. Of this amount $60,000 is to be preferred stock bearing interest at the rate of 10 per cent, payable semi-annually. The directors of the company are M. Bolton, John Barsby, E. K. Cobb, A. G. McGreevy, and G. E. Beaman.

FREDERICTON, N. B.—At the annual meeting of the stockholders of the New Brunswick Telephone Company held in this city, a dividend for the half year of four per cent was declared. The directors reported that the last year had been the most prosperous in the company's history. The new lines now being constructed between Fredericton, St. John, Newcastle and Bathurst will be in operation in a short time. Hon. A. G. Blair was re-elected president and Senator Thompson managing director.

REDWOOD FALLS, Minn.—At a special meeting of the stockholders of the Redwood County Rural Telephone Company called for the purpose of straightening out the financial affairs of the company, matters were so adjusted as to provide for wiping out the indebtedness of the company and placing it in condition for another year's work. A statement of the financial condition of the company, showed its resources to be $45,701.05, and liabilities, including stock, $43,621.72. The undivided profits amounted to $2,079.33; $2,628 was allowed for depreciation. The sum of $8,000 was provided to cover the indebtedness of the company.

MEMPHIS, Tenn.—The Memphis Telephone Company will increase its capital stock from $1,000,000 to $3,000,000 and to this end has filed a $3,000,000 mortgage in the Shelby county register's office, and the company is getting out a big bond issue which will be devoted to improving the local plant and developing it into one of the most complete and satisfactory telephone systems in the South. The remarkable growth of the business necessitates the extension and improvements of the system, which will include the installation of a new exchange in the eastern part of the city. Hervey Myers of Covington, Ky., is president of the company.

FREDERICKTON, N. B.—The Central Telephone Company of New Brunswick has been authorized by the provincial government to increase its capital stock from $209,000 to $1,000,000 for the purpose of extending its lines throughout the province. The company is making some extensive additions to its lines on the north shore, the principal one being a line now under construction from Newcastle to Bathurst, N. B., where it will connect with its Campbellton wire. The directors are considering an extension into St. John and are offering an exchange of 1,500 instruments at a rate of about $20. H. P. Robinson is manager of the company.

LOUISVILLE, Ky.—At a meeting of the board of directors of the Independent Long Distance Telephone and Telegraph Company a majority of the stock in the company was formally signed over to the Central Home Telephone Company on the basis of two shares of Central Home for one of Long Distance. The board also prepared a circular to notify all other stockholders that they may avail themselves of the same terms any time between now and July 9 by signing over their stock. The board also elected Judge J. M. Lassing a director to succeed Donald McDonald, resigned. Plans are said to be under way to take over the Louisville Home Telephone Company.

CLEVELAND, O.—The stockholders of the United States Telephone Company of Cleveland have voted to increase the capital stock of the company from $2,500,000 to $5,000,000. The purpose of the increase is to acquire the following properties: Youngstown Telephone Company; Stark County Telephone Company; Zanesville

Telephone Company; Columbiana County Telephone Company, Findlay Home Telephone Company; Citizens' Telephone Company, Fostoria; Massilon Telephone Company; Lancaster Telephone Company, which was authorized by the board of directors. Several new trunk lines will be added to the long-distance service within the present territory occupied by the company. The number of directors was increased from nine to fifteen.

SHENANDOAH, Ia.—The reports of the Mutual Independent Telephone Company show the company to be in a prosperous condition. The indebtedness at the beginning of the year was $18,000, including $13,500 6 per cent bonds, $3,000 to E. W. Comfort at 6 per cent and $1,500 to the bank at 8 per cent. During the year $1,000 was paid to the bank, thus reducing the debt to $17,000 and decreasing the interest. There was cash in bank of $1,049.34 on June 10. No dividends were declared in the June period, it being the thought of the managers that it is better to keep up the service, provide for the improvements necessary and reduce the indebtedness than to pay dividends. The property of each stockholder thus becomes more valuable and the dividends will be correspondingly increased.

MONMOUTH, Ill.—The annual report of W. J. McQuiston manager of the Monmouth Telephone Company, shows the company to be in a good financial condition. For the first time in its history the company is entirely out of debt, having paid over $3,000 of old indebtedness during the year and has a working balance of $710 in the treasury. The cash receipts this year show a gain of 15 per cent over the receipts of last year, which amounted to $14,388.15. The toll receipts have also increased at a rate nearly equal to the rent receipts, the gain being about 14 per cent over last year. The net profits, or the amount over and above the operating expenses and the interest on the bonds, is $5,278.46, or about 10½ per cent on the capital stock. The total number of telephones in city and country is 1,217.

COLUMBIA CITY, Ind.—A mortgage for $30,000, given by the Farmers' Mutual Telephone Company of this county in favor of Robert R. Scott, receiver, covering all its property holdings, has been filed for record. The purpose in issuing the mortgage was to protect the purchasers of $30,000 in bonds to be issued by the company in denominations of $100 each. The money derived from the sale of the bonds is to be used in the liquidation of outstanding debts and for contemplated improvements to the plant. Two hundred of the bonds are to be disposed of at once and the remainder are to be held in reserve by the receiver. The bonds carry 6 per cent interest, payable annually, and fall due June 30, 1911. The Farmers' Mutual has been in business about four years and has about 1,000 subscribers in the county.

CLEVELAND, O.—The stockholders of the United States Telephone Company have increased the capital stock of the company from $2,500,000 to $5,000,000. The preferred stock was increased from $500,000 to $1,000,000 and the common from $2,000,000 to $4,000,000. Of the new stock the preferred and $1,000,000 of the common goes to the Federal Telephone Company in exchange for various stocks and bonds of the subsidiary companies. This deal makes the United States Company the holding company of the other subsidiary companies with the exception of the Cuyahoga. There is left in the treasury for future use $900,000 of the common. One of the principal improvements the United States Company will make during the next year perfecting its system through Ohio, will be the main line between Cleveland and Wheeling.

MUSKEGON, Mich.—The Citizens' Telephone Company has authorized an issue of $50,000 of preferred stock, which is being offered at par to the holders of the company's common stock. This issue of preferred stock gives the company a total of $100,000 capital stock. The preferred stock is entitled to dividends at the rate of 6 per cent per annum, payable semi-annually on January 1 and July 1. The preferred stock is issued to provide money for the growth of the company. The company has paid dividends on its common stock since its organization at the rate of 8 per cent a year, payable semi-annually. The affairs of the company are in a very prosperous condition. There are over 1,300 telephones connected with the exchange and the number is increasing steadily. The company operates exchanges at Coopersville, Ravenna, Nuncia and Conklin.

REORGANIZATIONS

CLEVELAND, O.—At a meeting held in this city the reorganization of the United States Telephone Company and the Cuyahoga Telephone Company by the new owners was effected. H. C. Stifel and A. H. Bauer of St. Louis, Geo. Eustis of Cincinnati and Addison Brown of Cleveland were elected to the board of the Cuyahoga company to represent the new interests, retiring directors being J. B. Hoge, W. H. Lamprecht, R. A. Harman and H. D. McIntosh, all of Cleveland. C. A. Otis was elected to the board of the United States company to succeed F. S. Dickson. H. B. Taylor, of Toledo, was elected treasurer and auditor of the two companies, filling the vacancy caused by the resignation of R. W. Judd some months ago. Action was taken placing the common stock of the Cuyahoga company upon a 4 per cent, and that of the United States company upon a 3 per cent dividend basis. Quarterly dividends of 1 and ¾ of one per cent respectively were declared.

PERSONAL MENTION

GARRETT, Ind.—D. B. Van Fleit has been appointed manager of the Home Telephone Company.

JACKSON, O.—Thomas B. Phillips has been appointed manager of the Jackson County Home Telephone Company.

TAYLORVILLE, Ill.—W. R. Adams, manager for the Christian County Telephone Company, has resigned his position.

SAUK RAPIDS, Minn.—J. F. Rheud is endeavoring to interest local capital in the formation of a local telephone company.

FAIRMOUNT, Ind.—Eugene Kelly has resigned as manager of the Citizens' Telephone Company and will be succeeded by William Trader.

SCHENEVUS, N. Y.—Orra L. Tipler of this place has been appointed manager of the Oneonta exchange of the Home Telephone Company.

BOWLING GREEN, O.—W. H. Wallace has been appointed manager of the exchange of the Wood County Telephone Company at this place.

COLUMBIA CITY, Ind.—Louis W. Dunfee, secretary of the Farmers' Mutual Telephone Company, has resigned his position with that company.

TERRE HAUTE, Ind.—Albert Schuler has been appointed superintendent of maintenance and operation by the Citizens' Independent Telephone Company.

BEDFORD, Pa.—John Faint, of Philadelphia, has been appointed manager of the Bedford County Telephone Company with headquarters at this place.

PAWNEE CITY, Neb.—C. M. Smith of Lincoln is interested in the construction of an Independent long-distance telephone line from this city to Tecumseh.

CLINTON, N. Y.—John Price has been appointed superintendent of the Clinton section of the Home Telephone Company. The company contemplates many improvements.

SPARTA, Tenn.—At a meeting of the directors of the Gainesboro Telephone Company, Joel Anderson, general manager, tendered his resignation and Oliver Anderson of Monterey was elected to fill the vacancy.

UTICA, N. Y.—G. Arthur Jackson, who has been auditor of the Utica Home Telephone Company since its organization, has resigned to take a similar position with the United States Independent Telephone Company.

LINCOLN, Neb.—General Manager F. E. Ebersole, of the Lincoln Telephone Company, has resigned his position to enter construction work in the east and he will be succeeded by City Electrician Leonard Hurtz.

PARIS, Ill.—Albert Foster, superintendent of construction of the Citizens' Independent Telephone Company of Terre Haute, has been appointed general superintendent of the Wabash Valley Telephone Company of Paris.

GREELEY, Colo.—I. H. Gaither, who has recently resigned as chief engineer of the Atlantic Coast Construction Company, Suffolk, Va., has been appointed general manager of the Northern Telephone Company, with headquarters at Greeley.

UTICA, N. Y.—Edward L. Cline, who has been engineer of the Utica Home Telephone Company since its organization five years ago, has been appointed manager of the Home Telephone Company of Toledo, O., which operates about 11,000 telephones.

THORNTOWN, Ind.—George Lyster has resigned as manager of the Thorntown Telephone Company. During his management the system has been practically rebuilt, lines have been extended into the country and the list of subscribers has been more than doubled.

MANKATO, Minn.—John C. Skuse, formerly with the Mankato Citizens' Telephone Company, has accepted a position as manager with the New Ulm Rural Telephone Company, which operates a telephone exchange in New Ulm and has thirty-five rural lines with about 800 subscribers.

SCHENECTADY, N. Y.—Samuel M. Strong, who has been with the local telephone company as manager since its organization, has resigned his position. He is leaving the active service of the company to accept the management of the up-state branch of the banking house of W. N. Coler & Company of New York City, which is to be opened in this city in the near future. Mr. Strong will retain the secretaryship of the company.

MANDAN, N. D.—H. P. Lyon of this place has been elected president of the North Dakota Telephone Company, recently organized. The first improvement planned by the new company will be the construction of a line from Fargo to Bismarck to connect at Fargo with the Tri-State Telephone Company. Through this new organization the Tri-State Telephone Company, which has heretofore been denied a franchise at Fargo, hopes to gain an entrance.

COMBINATIONS

EDINA, Mo.—The Edina Telephone Company and the farmers' lines have consolidated. Many improvements will be made in the new system.

ACKLEY, Ia.—A movement is on foot to consolidate all the general telephone lines in Hardin, Hamilton, Story, Marshall, Grundy and Franklin counties.

SIDNEY, Ia.—The Independent and People's Mutual Telephone companies have consolidated. The system resulting from the merger will be greatly improved and extended.

KENDRICK, Idaho.—It has been decided to merge the farmers' telephone lines in this vicinity and establish a central office at this place. The four lines have about 400 subscribers.

BISMARCK, N. D.—The Twin City Telephone Company has been merged with the North Dakota Telephone Company. The officials of both companies were present at the signing of the agreement.

FARGO, N. D.—Announcement has been made of the consolidation of a number of the Independent telephone lines in North Dakota and the organization of the North Dakota Independent Telephone Company, with headquarters at Fargo. The stockholders of the new company are said to be prominent bankers and business men of the state. Connection will be made with the Tri-State Telephone Company. The new company will begin business with about a thousand miles of toll lines and expects to begin at once the construction of standard copper lines to reach every town in the state in due time.

TRANSFERS

VIRGINIA, Ill.—J. G. Pratt has purchased the telephone exchange at Ashland.

FAIR PLAY, Mo.—The telephone exchange owned by J. D. Randall has been purchased by C. E. Oldham.

VINSON, Okla.—The telephone system formerly owned by W. A. Ambler has been purchased by G. F. McCauley.

NEW SALEM, Mass.—The Highland Telephone Company has purchased the North Leverett company's lines.

SHAKOPEE, Minn.—The Shakopee Telephone Company has purchased the Star Telephone Company at Savage, Minn.

EAST PERU, Ia.—The Peru Telephone Company, formerly owned by J. W. Mulhern, has been purchased by M. F. Foster.

ORD, Nebr.—The Ord Telephone Company has purchased the business of the local telephone company at North Loup.

FAYETTE, Mo.—The Shepler Telephone System has been purchased by the Mutual Telephone Company of this place.

PRESTON, Ia.—The Farmers' Organization has purchased the Nate Millhaem telephone lines at this place and Miles for $10,500.

GASTONIA, N. C.—The Piedmont Telephone and Telegraph Company has purchased the telephone exchange at Gaffney, S. C.

COOK, Neb.—H. F. Cannon has sold his telephone exchange in this place to the Johnson County Home Telephone Company.

KELLYTON, Ala.—John T. Cason has purchased the telephone line from Kellyton to Rockford and will greatly improve the same.

GEARY, Okla.—M. A. Smedley has purchased the interest of the Geary Telephone Company in the toll line from Geary to Etna.

ROSEVILLE, Ill.—Henry S. Brown of Monmouth has purchased a controlling interest in the Roseville Telephone Company and the same will probably be extended.

HANOVER, N. H.—The Hanover Telephone Company has purchased the Hanover branch of the Norwich telephone line. H. T. Howe is president of the company.

WASHINGTON, Ia.—W. A. Wilson and L. D. Robinson have sold their telephone interests to the Washington Telephone Company. This company is taking in about all the county lines.

SAUK CENTER, Minn.—The Sauk Center telephone exchange and branch rural lines, formerly owned by J. W. Ward, have been purchased by the Northwestern Telephone Exchange Company.

CHADRON, Nebr.—The Chadron Telephone Company which has just been incorporated will take over the exchange now owned by A. W. Rickman, who is the principal stock holder of the new company.

SASKATOON, Sask., Can.—J. C. Drinkle of this place and John Wilie, of Moosomin, Alb., have taken over the plant of the Saskatchewan Telephone & Electric Company and will overhaul the entire system.

GRAND, Okla.—The Day County Telephone Company has been incorporated with a capital stock of $5,000. The incorporators are J. P. Johnson, E. S. Sharp, E. L. Mitchell, W. H. Hauser, S. Crim, Jr., T. C. Moore.

SOUTH BOSTON, Va.—The South Boston Telephone Company, formerly owned by R. A. Perkinson, has been purchased by the Dan River Telephone Company. Under the new management the system will be greatly enlarged.

ELIZABETH CITY, N. C.—A deed has been recorded which conveys to the Norfolk and Carolina Telephone and Telegraph Company all the property of the Elizabeth City Telephone Company, real, personal and mixed, which was purchased by the former some time ago.

COOLEYVILLE, Mass.—The Highland Telephone Company is negotiating for the purchase of the telephone lines owned by G. V. Bowen in North Leverett and Leverett. The company will build a line from Cooleyville through Locks Village to Moore's Corner to connect with the North Leverett lines.

LEGAL ITEMS

GREENFIELD, Ind.—Charles Faucett of Fortville has filed suit against the Fortville Telephone Company for $600 damages for its refusal to give him connection with a party wishing to talk with him.

TRENTON, N. J.—On August 15 the entire rights of the Interstate Telephone Company will be sold at public auction at the sheriff's office. The sale is a part of what is known as the reorganization plan of the company.

IONIA, Mich.—Suit has been commenced in the Ionia circuit court for $50,000 damages against the Citizens' Telephone Company by Archie Chickering of Belding, for injuries sustained while in the employ of the company.

TRENTON, N. J.—The report made by John T. Bird in the foreclosure case brought by the bondholders of the Interstate Telephone Company has been confirmed by Chancellor Magie and Bayard Stockton has been appointed to make the sale.

SYRACUSE, N. Y.—George W. Rogers of this city has brought suit in the Supreme Court, through his attorney, Frank C. Sargent, against the Independent Telephone Company for $15,000 damages for injuries alleged to have been received by falling into an unprotected ditch in which the company was laying subways.

BALTIMORE, Md.—The Maryland Telephone & Telegraph Company has appealed to the city court from the assessment of $945,000 placed upon it by the Appeal Tax Court. It is alleged that the assessment is illegal, because made on the corporate rights of the company, which are not taxable and because it includes two separate kinds of property.

LOS ANGELES, Cal.—Ida Mae Lewis has brought suit against the Home Telephone & Telegraph Company for damages amounting to $20,399 for injuries sustained while in the employ of the company. Her complaint is that the company did not properly light its building after midnight in consequence of which she fell down stairs and has been unable to work since.

GREENFIELD, Ind.—Dr. Frank W. Cregor, receiver of the Hannah-Jackson Telephone Company, applied to the Hancock County Circuit Court for an order to sell the plant, but the creditors objected and requested a postponement, which means that the receiver will continue to operate the plant until next October at least, as the court has now begun its summer vacation.

SIDNEY, Neb.—The affairs of the Independent Telephone Company, which have been in litigation for several months, have been adjusted in the United States court at Omaha. A compromise has been effected whereby the property will be turned over to local parties. The line has been neglected on account of the pending litigation and now the necessary repairs will be made and the system put in first class order.

DAVENPORT, Ia.—The Davenport City Council at a special meeting repealed the 2 per cent franchise tax imposed upon the Union Electric Telephone & Telegraph Company. The action of the council was unanimous and followed a careful examination of the company's books and sworn statement from its officers, which showed that the tax was so burdensome that the company could not continue the business if it were maintained at the rates fixed by the franchise.

GREENFIELD, Ind.—Whether a telephone company has the power to charge a higher rate for service to an incessant user is to be determined by a suit filed by Charles Faucett of this city against the Fortville Telephone Company. The Fortville company increased the price of the service to Faucett because he used the telephone oftener than other subscribers, but he refused to pay more than the rate charged others and asks for $600 damages for being refused connection.

DECATUR, Ind.—William Smith and other stockholders in the Home Telephone Company, of Monroeville, have begun proceedings in the Supreme Court for the appointment of a receiver, making Simon Metzer, president; Joseph Clem, vice-president; Geo. E. Spake, secretary and treasurer, and J. Emmett Whitney, defendants. The charge is malfeasance in office, $10,000 of the company's assets having, it is alleged, been voted to officers or individuals which had not been earned. The company has been paying 8 per cent. The question of insolvency is not involved. The litigation

followed an attempt of Secretary-Treasurer Spake, who built up the exchange to 800 subscribers, to obtain a larger salary. The company is capitalized at $75,000.

RICHMOND, Ind.—Action for an injunction to prevent the Richmond Home Telephone Company from cutting off its service has been filed in the Circuit Court by the Eaton Telephone Company. A temporary restraining order was granted by Judge Fox, precluding the severance of business relations between the local company and the exchangs of the Eaton company at Eaton and Campbelltown. The trouble grows out of the fact that the Ohio towns have taken on the Bell lines. It is stated that a number of other exchanges will also cut off connection and that as soon as possible Independent companies will establish toll stations at each of these towns and that new companies will be organized to establish new Independent exchanges in all of these places.

KANSAS CITY, Mo.—The suit of the People's Telephone Company to compel the Home Telephone Company to surrender $40,000 in stock was decided in favor of the defendants by Judge Park in the circuit court. The original franchise for the Home company was granted to John Enoch of St. Charles, Mo., who in turn sold it to the present company, but another company, the People's of St. Louis, claimed that by virtue of an agreement with Enoch it was entitled to the $40,000 in stock Enoch was to receive for his right to put in a telephone system in Kansas City. Enoch surrendered all his rights to the Home Telephone Company in consideration of a cash payment of $5,000, and Judge Park decided that the People's company was entitled to nothing.

TOPEKA, Kans.—The right of cities of the third class to regulate telephone companies will be tested in a suit appealed to the Supreme Court from the decision of the McPherson county district court. The suit was brought by the Burton-Inman Telephone Company to enjoin the mayor and officials of Inman from enforcing ordinances which had been enacted for the purpose of regulating the company. The mayor and officials of Inman organized a telephone company and the Burton-Inman company refused to sell its plant to the new company. The officials then enacted several ordinances regulating the old company. The latter obtained a temporary injunction against the enforcement of the ordinances, but this was dissolved by the district court and an appeal has been made from this decision.

BEAUMONT, Tex.—The Beaumont & Northwestern Telephone Company, which was placed in the hands of a receiver last September on its own application, has been turned back to the owners, the receivership having been dissolved by the court and the receiver, J. M. Mackey, discharged. The Beaumont & Northwestern is a long distance line operated in connection with the Beaumont Independent Telephone Company. About two years ago the line was leased to the Lone Star Telephone Company for forty-nine years at a stipulated rental payable quarterly. The Lone Star defaulted in its payment and suit was brought to cancel lease and secure the return of the property, and for this purpose a receiver was appointed. A judgment has now been entered canceling the lease and terminating all litigation. At no time has the company been financially involved.

TRENTON, N. J.—Special Master John T. Bidd has filed in the Court of Chancery his report in the litigation against the Interstate Telephone Company, involving the right of Oscar Keen of Newark, receiver of the concern, to take charge of the property. He certifies that the title of the property acquired by Keen was subsequent to that of the mortgage of $5,000,000 and that the principal and the interest on the mortgage should be paid before any claim presented by Keen is allowed. Mr. Bidd also advises that the property be sold to satisfy the mortgage, and recommends that it be sold in one parcel. The proceedings were brought by Carroll Robbins of this city, acting as trustee under the mortgage. The special master finds that the $5,000,000 worth of bonds were authorized by the company and a mortgage was executed to the Trenton Trust and Safe Deposit Company. Under the mortgage bonds were issued to the amount of $1,913,000. The company defaulted in the interest on the bonds, amounting to $141,083.35, on July 1, 1905. The finding is therefore that the principal and interest, amounting to $2,054,083.85, is now due and it is to satisfy this indebtedness that the sale is recommended. Plans are under way for the reorganization of the company. The company operates telephone systems throughout the state.

MISCELLANEOUS

ORANGE, Wis.—A movement is on foot to build a telephone line from Orange to Spooner.

ROCK LAKE, N. D.—The question of a local telephone system is being agitated in this place.

FLORENCE, Nebr.—The Florence Telephone Company now has its exchange in full operation.

WALLA WALLA, Wash.—At a recent meeting of the city council Charles E. Sumner, who was granted a telephone and telegraph franchise in November last, formally notified the council that he had assigned all his rights to the Home Telephone and Telegraph Company of Portland.

GRANGER, Wash.—A Farmers' Mutual Telephone Company is being organized by the farmers of this vicinity.

RICH HILL, Mo.—Gander Brothers are interested in the formation of an Independent telephone company in this place.

LORAIN, O.—The Black River Telephone Company has just issued a new directory, which shows 3,000 telephones in service.

BELLINGHAM, Wash.—The Home Telephone Company has let the contract for the preliminary work on its new exchange building.

NIAGARA FALLS, N. Y.—The convention of the New York State Independent Telephone Association will be held in this city in August.

WILKESBARRE, Pa.—Representatives of the Independent telephone companies in this state will meet in Allentown September 11, 12 and 13.

THOR, Ia.—A committee has been appointed to investigate regarding the advisability of installing a telephone system. S. K. Groth is chairman of the committee.

WHITTIER, Cal.—The Whittier Home Telephone & Telegraph Company, which has 510 telephones in service, pays 4 per cent per annum on its outstanding capital stock of $50,000.

LANDSOWNE, Ont.—Landsowne is being equipped with an Independent telephone line. The service is controlled by the Landsowne Rural Telephone Company, recently organized.

WILSON CREEK, Wash.—The Wheeler Telephone Company has about completed arrangements for the installation of its system and the same will be in operation within a short time.

LAWTON, Okla.—The citizens of Lawton are very much dissatisfied over the poor telephone service and will likely grant a franchise to a second company that desires to do business here.

INGERSOLL, Ont.—The Ingersoll Telephone Company, which was recently granted a franchise for a period of 28 years, expects to have its system installed and in operation by the beginning of the year.

SKIATOOK, I. T.—A new telephone exchange is being installed here by a local telephone company under the management of T. F. McVay, which will also extend to the oil fields south of this place.

LORAIN, O.—The Black River Telephone Company is building new farmer lines and is arranging for extensive improvements to the local exchange, entailing the expenditure of several thousand dollars.

PRINCETON, Ill.—A meeting was recently held in this city in the interest of the Farmers' Mutual Telephone Company. A number of shares of stock were taken and prospects are good for the success of the enterprise.

FLORA, Ind.—The Flora Telephone Company has taken over the Home Telephone Company, which it purchased a short time ago. The combined plants will be improved, new equipment installed and better service given.

HAVELOCK, Neb.—Local capital has become interested and negotiations have been started with the Plattsmouth Telephone Company for the purchase of the Havelock system. A. A. Hyers is one of the promoters of the project.

IOLA, Kans.—The construction of the new central energy telephone system has been completed. The company has 600 subscribers and orders for 300 additional telephones. It is expected that the number will reach 1,000 inside of a month.

MEXICO, N. Y.—Plans are being formulated for the organization of an Independent telephone company in this city. C. I. Miller of Mexico, Manager Bomster of the Black River Telephone Company, and John Nellis of Syracuse are interested in the enterprise.

COLUMBUS, Ga.—The Automatic Telephone Company of this city has consummated a deal with the Hamilton Telephone Company by which this city will be connected with Hamilton and about a dozen other towns, thus adding about 500 telephones to the company's list.

ELWOOD, Ind.—The Delaware and Madison Counties Telephone Company has now invaded eastern Tipton county and is adding a number of subscribers to the rural lines in that direction. The company recently enlarged its capacity, which enables it to accommodate the new subscribers.

ALLENTOWN, Pa.—Several hundred officers and stockholders of the Consolidated Telephone Companies recently held an important meeting in this city for the discussion of the question of underground wiring, the advantages of consolidation and the ways and means of improving service.

ST. PETER, Minn.—At the annual meeting of the Nicollet County Telephone Company reports showed the condition of the company at the end of the fiscal year, April 30 to be as follows: Resources, $118,496.40; liabilities, $10,007.61; expenses, $7,580.01; company's present value, $108,488.79; total gain, $16,068.80; net gain for year, $8,488.79; necessary to pay dividends, $6,605.35; undivided profits, $1,883.44.

ITEMS FROM THE RURAL LINE DISTRICTS

Illustrated by R. McMahon

Telephones all burned out Monday.—*Jonesville Note in Warsaw (Ky.) Democrat.*

Frances Whitecotton bought a dandy new 5-bar phone this week.—*Parsons (W. Va.) Democrat.*

Grandpa Robinson is putting in a new phone this week, west of Indian creek.—*Ringwood (Okla.) Leader.*

Jake Heyman is still in the phone business and says he sells the best phone on the market.—*Bolton (Kans.) Tribune.*

E. R. Jones went to Staples to-day to hunt trouble on the toll line of the telephone company, the line having struck work to-day. —*Brainard (Minn.) Tribune.*

The Burt branch of the Liberty Telephone Company were putting on another wire the first of the week.—*Duck Creek Notes in Yates Center (Kans.) Advocate.*

Corsicana's new telephone company is making valuable and extensive improvements. Like everything in the Oil City the new 'phone is progressing with the times and demands.—*Corsicana (Tex.) Light.*

The telephone gang is kept busy getting the lines in proper condition, as a number of improvements are being added, while increasing the number of telephones.—*Partridge Items in Hutchinson (Kans.) News.*

The telephone is a sure thing now, as the places are dug and the poles are strewn along the line. The boss says they expect to have the work all done in two weeks.—*North Center Correspondent in Janesville (Wis.) Gazette.*

The Mill Creekers held a meeting and decided to construct a telephone line along Mill Creek to Newburg; such has long been needed in that community and will be appreciated.—*Arroyo News in City of Retta (Mo.) Era.*

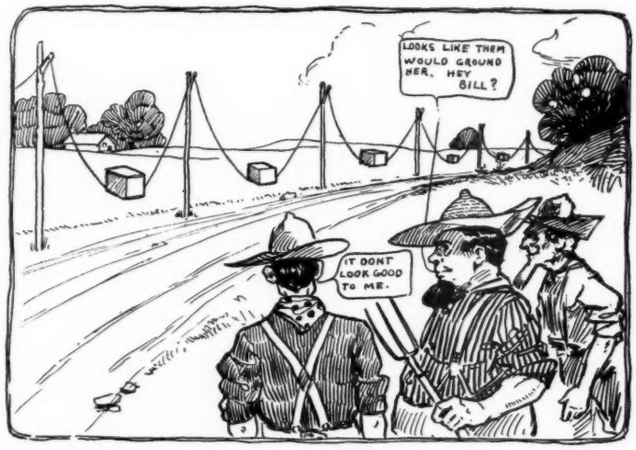
The telephone line will be carried on through to Austa in the near future. It will be a good one, if nice, straight poles will make it. Mr. Sherwood delivered them.—*Winterfield Items in Cadillac (Mich.) News and Express.*

About forty young people gathered at the home of Thomas Peacock Friday evening. All enjoyed a good time. They made the telephone go ting-ting toward the wee small hours of morning. —*Big Patch Notes in Cuba City (Wis.) Herald.*

The Looking Glass Prairie Telephone Company on Friday voted to increase its capital stock from $2,500 to $10,000. The company will build a line over the eastern section of St. Clair county, with exchanges in Mascoutah, Summerfield, Trenton and Lebanon.—*Belleville (Ill.) News-Democrat.*

CARAMBA! GETTA OFFA DA FEETA
LOOK OUTA SPEGITTA
DERS A FINA DA PEACE
ALL ABOARD
SPECIAL CAR FOR TELEPHONE EMPLOYEES
GOTTA DA LIGHT A?
I GO BACK TO SUNNY ITE
STOP! LIVELY NOW
DIME BARS DIME

One of the most interesting sights the borough affords is that of the Italians employed by the telephone company in laying the conduits loading themselves into the special car that comes up for them every afternoon at 5:30. They swarm all over the cars like monkeys in their anxiety to get seats.—*Media Mention in Chester (Pa.) Republican.*



The new Magnet, Mt. Pleasant and Leopold telephone line was completed last week and is now in good working order, there being several boxes on the line. Our citizens are all well pleased with the service.—*Mt. Pleasant Jottings in Cannellton (Ind.) Telegraph.*

Mr. Fred Brown was around seeing how many of our farmers were wanting the telephone line through our prairie. He said that all were wanting it with the exception of one or two. The Independent line is working up three counties to join each other.—*Gathton Briefs in Greenville (Ill.) Sun.*

The telephone company are improving the line from Mrs. Ely's to old Hamburg bridge by replacing old poles with new ones, trimming out the trees in the cedars, changing the position of the poles from their present location, and erecting a straight course generally. —*Hamburg Notes in Deep River (Conn.) New Era.*

The Wilbert Lakeshore telephone line is in working order now and many neglect their work in order to "rubber." That will stop, however, when it gets to be something old. The subscribers of the above named telephone company met Wednesday night at the home of Jacob Muth and wound up their business affairs.—*Tenhassen Notes in Fairmount (Minn.) Sentinel.*

Agents for the telephone company have been in this vicinity the past week and secured subscribers enough to warrant their building a line to Melrose. Ed. Miller, of Hixton, who is president of the company, says that they will have the stakes set by the last of the week. They have secured about sixteen patrons, besides those who already have 'phones.—*Disco Items in Melrose (Wis.) Chronicle.*

Some new telephone lines are being built; where they run I know not. They were "at rest" when seen. Many places in the old lines need repair. They are a menace to life in present conditions and whoever is responsible may be called upon to pay damages. A rapid ride or drive in the dark must almost surely result in an accident. They are obstructing the highway and should receive immediate attention.—*Princeton (Mo.) Democrat.*

THAT TELEPHONE IN THE OFFICE.

O'er the telephone wire, to arouse my ire,
In the midst of the daily grind,
Come questions galore that rankle and bore,
And make me think thoughts quite unkind.
With fervor and zest I'm impressing a guest,
Who may be a man or a miss;
As my con song I'm singing the bell begins ringing
And I pause to take something like this:
"Hello! Hello! Is this the hotel? I'm dying to talk to Jack Cass. That isn't his name, but it's nearly the same, and he sells either harness or glass. He wears a long coat and I sent him a note, which I'm anxious to know if he got. What's his real name, you ask? O, dear, what a task! Why, really, you know, I've forgot."

—*F. C. Ambrose in Hotel World.*

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100 Stromberg-Carlson Receivers - -	$1.00
100 Kellogg Receivers - - - -	.75
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500 Single Pole Receivers - - -	.25
200 Kellogg Solid Back Transmitters -	1.00
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Order either or both; sent on 30 days' trial, without obligation.

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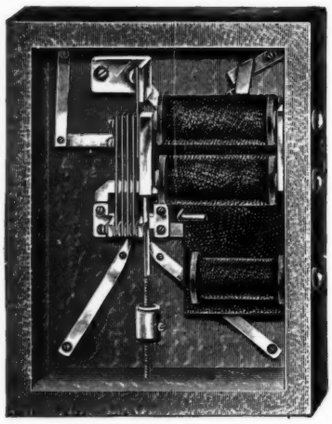

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EVERYBODY is interested in dry batteries.

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If it were not to YOUR advantage to know all about this battery it would not pay us to advertise.

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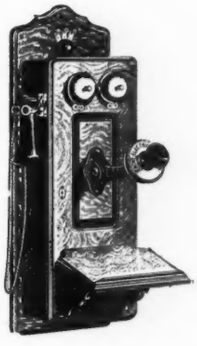

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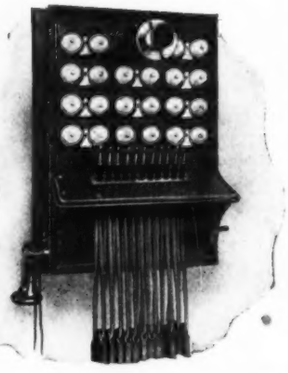

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SUMTER, S. C.

IT'S VACATION TIME——FOR SOME OF US

"We're weary a-walking the highway of life;
We're fretted and flustered with worry and strife."

This is THE time of year when we ALL hear the "call of the wild." No one MORE than the man at the desk with out-look over HEATED roof and DUSTY street. If YOU happily can PLAY this month, REMEMBER, WE are WORKING, and instruct the PROPER PARTY to send US your ORDERS, for our BUSY SPRING has been followed by a HUSTLING SUMMER business. If YOU are working too, send us YOUR orders. There is no better time than NOW for you to realize the TRUTH of our claims for PROMPT shipment and ATTRACTIVE prices covering our extensive line of telephone apparatus and CONSTRUCTION MATERIALS.

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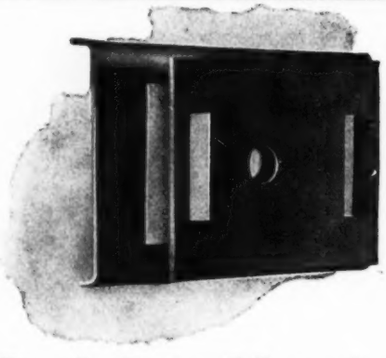
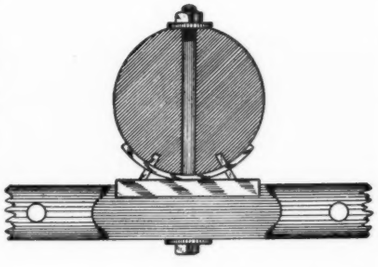


"Bull Dog" Steel Gain

A pressed steel support for cross arm consisting of two plates, one engaging the arm and the other the pole. It provides a means of mounting arms without cutting gains. It strengthens the arm and pole. It facilitates the placing and alignment of cross arms. It saves braces on four and six pin arms. It can be purchased at a cost slightly exceeding the cost of cutting a gain. It is made for telephone and standard arms and will fit any pole.



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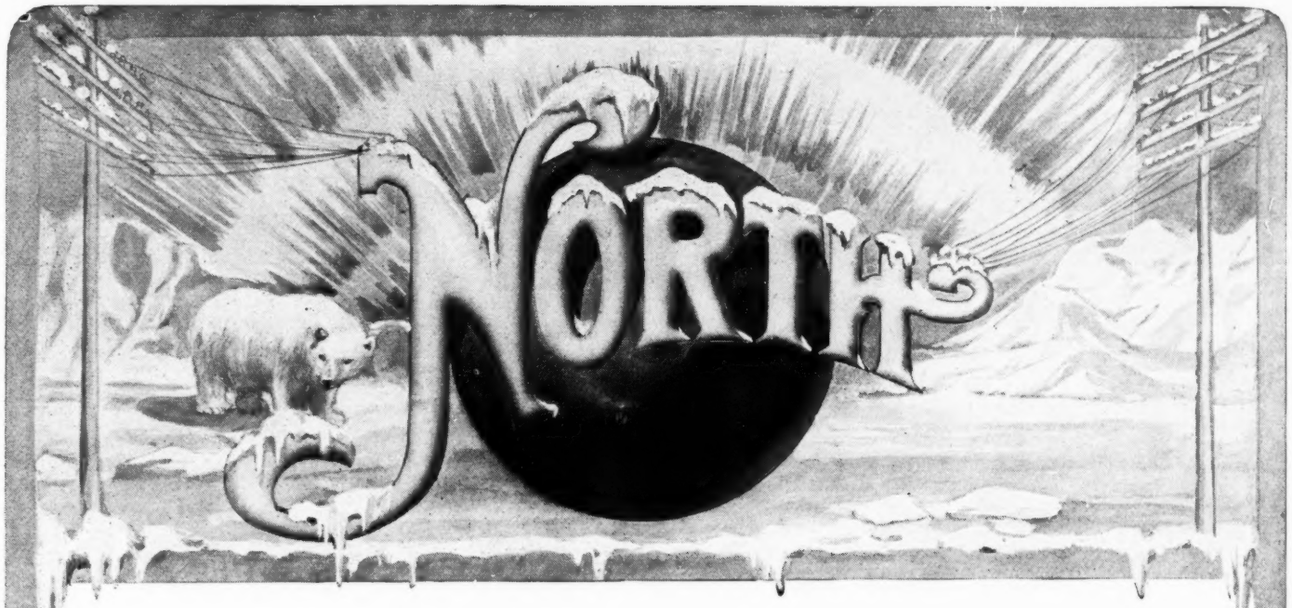
Steel Gain Manufacturing Co., 16 So. Clinton Street, Chicago



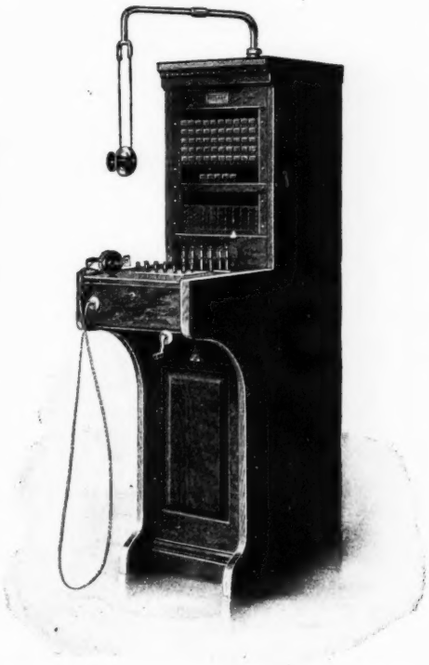
ANOTHER of North's Unit Type Switchboards—a new one—has a capacity for fifty lines—will accommodate twenty more with a little crowding.

Built for the small exchange that is expected to grow. With this type of switchboard it is necessary to purchase for your immediate needs only. You can buy the cabinet wired to its full capacity and equipped with as few as ten lines. The capacity can be increased at any time by additions of ten line strips of drops and jacks. Additions are easily made—just screw the strips to the mounting frames and solder the wires to the terminals. Wired for eight cord pairs—equipped as desired—additional pairs easily installed.

When all the lines are full add on another cabinet, move the transmitter support to the center and go ahead, no cutting or marring of moulding, a nice feature should you want to separate the cabinets and use them in different places.

Built with the same care and attention to details as the larger capacity boards— the apparatus is the same standard parts.

The cabinet is quartered oak, kiln dried, hand polished. Hinged keyboard, front and back panels removable for access to wiring and parts. Leather covered plug shelf—cushioned plug seats.



The drops are very sensitive and free from cross talk—coils incased in soft iron shells—not tubes of sheet steel formed up, but solid Norway rods bored out. Mounted in banks of ten, apart from jacks.

The jacks also mounted in strips of ten and easily removed. Aluminum base, German silver springs and pure platinum contacts. They cut out both sides of drop and keep line balanced.

Roller bearing keys with German silver springs and pure platinum contacts.

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THEN
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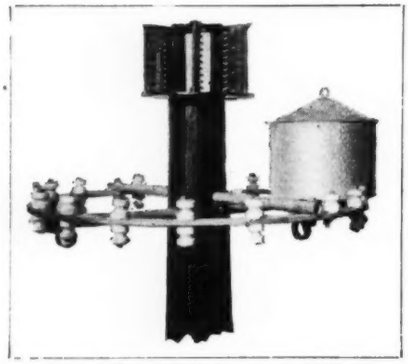

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The record for one gang of men in one day with these trolleys is 10,000 feet—about two miles, you see.

Better sit right down and write for full information about them and other SECURITY SPECIALTIES.

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The Hargis Cable Splicing Joint

(PATENTED)

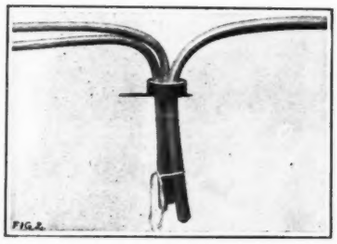
FIG. 2.

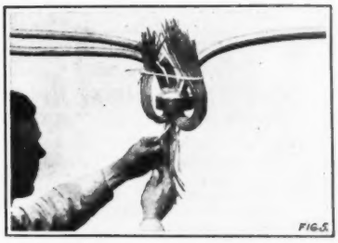
FIG. 5.

It consists of a lead sleeve, closed at one end, the other end being sweated to an externally-threaded brass collar, which screws into an internally-threaded brass cap, having an extended rim and an inward off-set for supporting a lead gasket. This gasket to be bored for the number and size cables which it is desired to splice. (**The gasket is furnished solid.**) Under the offset in the brass cap is a rubber washer. The act of screwing the bottom of the sleeve on, binds the rubber washer against the under side of the offset. (See Figure 1).

The method of installing the joint is substantially as follows:

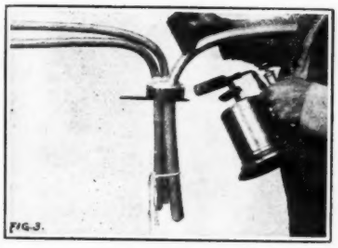
FIG. 3.

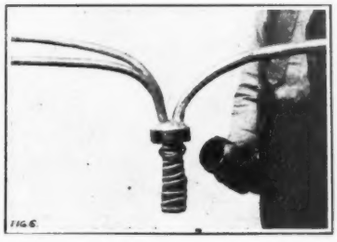
FIG. 6.

The cables are bent at right angles to the messenger, and the lead gasket put on. The brass cap is then drawn up under and wedged or tied in place (Figure 2), cable and gasket having been previously shaved, so that the solder will adhere readily. The solder at a little above wiping heat, is then poured in, until the cup formed by the gasket resting on the offset is filled to the desired height. Any roughness left by the solder being poured unevenly, is then smoothed with a blow torch and wiping cloth (Figure 3). The armor is then taken off the cable. This is done by marking around the cable with a chipping knife before they are put through the gasket, so that a slight bend will cause the armor to break where it is marked. Exposed wires should then be boiled out (Figure 4), spliced (Figure 5), and laced (Figure 6) in the usual manner. The joint is completed by screwing on the bottom of the sleeve (Figure 7.

FIG. 4.

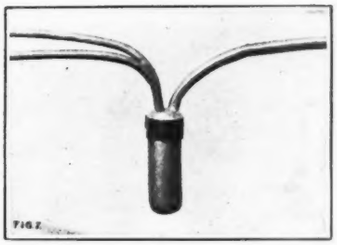
FIG. 7.

The Hargis Joint has many advantages over a horizontal wiped joint, and is accessible at all times for testing or changing a multiple.

A "pair" can be picked out in much less time than is possible in a horizontal splice. This is due to the fact that one end of the splice is loose, and as a pair is tested, it can be bent back out of the way (See Figure 5).

A number of "pairs" may be left "dead" in this sleeve, and when they are required, simply bore a hole with an ordinary wood augur in the "leaded" top to fit the size of cable required to splice the "dead pairs," then "lead" this cable in as was originally done.

By the use of the HARGIS SPLICING JOINT, a splice can be boiled out without the use of a drip pan (See Figure 4.) Simply take the boiling pot and bring it up under the splice, so that the wires go directly into the paraffine. Nearly every cable-splicer's platform is soaked with the paraffine that is wasted in using a drip pan, making it dangerous for workmen to stand on it.

If the Hargis Cable Splicing Joint is used, no splice need ever be left open over night. The top of the sleeve can be "leaded" in a few minutes. The armor can be removed, the wires laced to prevent damage to the insulation, and the bottom of the sleeve screwed on.

The Hargis Joint can be used any number of times. When cable is taken down, the ends can be taken out of the joint, a new gasket put in, and it is as good as new.

The soldered part of the joint is on top, where it can be readily examined for pin-holes. It is peculiarly adapted to under-ground work, for the reason that its shape allows of the greatest economy of space in man-holes. The Hargis Joint lends itself to some very pretty work in making turns at a branch joint in aerial cable. In fact, it is adaptable to any and all kinds of up-to-date cable work.

We will ship any number of Hargis Cable Splicing Joints, over twenty-five, by prepaid freight, on thirty days' trial. Pay for them if satisfactory; return them, freight charges collect, if not.

They are made in four sizes: No. 1, 2, 3 and 4. At present (Sept. 1, 1906) we can make shipment of the No. 1 and 2 only. They are adaptable to cables of 200 pair or less. The rest can be shipped later.

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Write us regarding special voltmeters with very high resistance, particularly adapted for cable testing.

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The only standard portable instrument which deserves this name Absolutely permanent if not abused.

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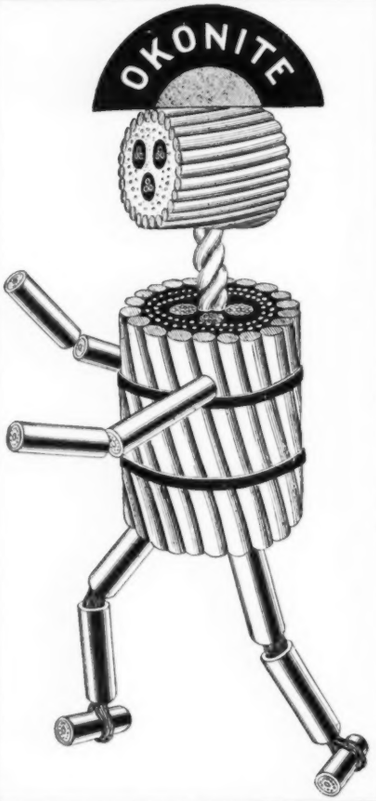
The most accurate and most convenient absolute standard ever offered.

Portable Direct Reading Wattmeter for Alternating and Direct Currents.



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THE BEST TELEPHONE SERVICE

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One gong only.

One ring for 5 cents.

Two rings for 10 cents.

Five rings for 25 cents.

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NO TROUBLE

It keeps collections right

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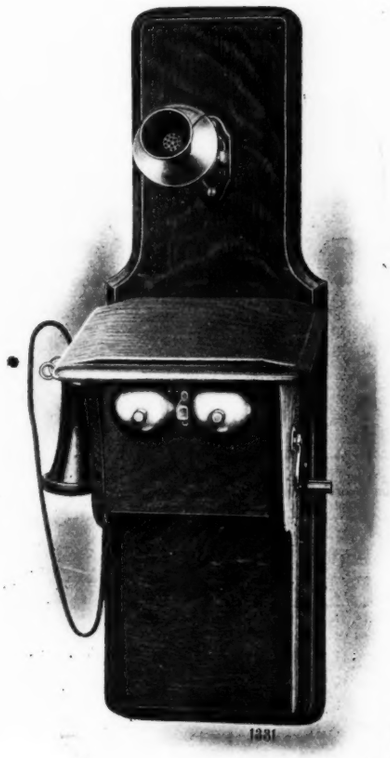
The United States Coin Register Co.

TOLEDO, OHIO

Note the Simplicity and General Arrangement of Apparatus in Our

New Type of Standard Bridging Telephones

It has all the Individuality, Superiority and Attractiveness of our Central Energy Instrument.



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The Dry Cells are located in the lower end of the cabinet and are entirely shut off from the other apparatus. The Generator is mounted on a specially designed shelf and in addition is securely fastened to the back-board. Knowledge, skill and long experience have produced results of very great value to purchasers and insure the highest grade of workmanship and material. Write to-day for Bulletin No. 19-C. You should have a copy of Bulletin No. 18, containing 183 pages on construction material.

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